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AN ECONOMIC STUDY OF THE PRODUCTION AND MARKETING OF APPLES IN OXFORD COUNTY, MAINE

A THESIS

PRESENTED TO THE FACULTY OF THE GRADUATE SCHOOL OF CORNELL UNIVERSITY FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

BY

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BULLETIN 347

AN ECONOMIC STUDY OF 93 APPLE FARMS IN OXFORD COUNTY, MAINE. 1924-1927

By Charles H. Merchant[1]

SUMMARY

The study includes the findings on 93 Oxford County apple farms for a three year period, April 1, 1924 to March 31, 1927. All averages in this summary are based on the three years' study.

The average capital per farm was $7,592.06. This capital consisted of $5,690.10 in real estate, $1,010.68 in livestock, $795.68 in machinery, and $95.60 in feed and supplies. The average value of orchard land per farm was $1,631.23, or 28.67 per cent of the total value of real estate.

The average gross receipts per farm were $2,679, made up of $990.10 from crop sales; $324.42 from livestock sales; $722.49 from livestock products receipts; $486.08 from miscellaneous receipts; and $156.22 by increases in inventories. The gross receipts from apples sold averaged $725.69 per farm, or 27.08 per cent of the total receipts.

The farm expenses averaged $2,125.85 per farm. Of this amount $81.80 was for livestock purchased, $1,894.37 for general farm expenses, and $149.68 to cover decreases in inventories.

The average farm income, or the difference between receipts and expenses, was $553.46. The interest at 5 per cent on the average investment was $379.60, which, when deducted from the farm income, leaves $173.86 as an average labor income for the operator.

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[1]The writer was assisted in the field by J. L. Babson, Jr., and J. E. LaPlant during the second year; and by J. L. Babson, Jr., G. F. Dow, H. A. Grant, A. B. Lewis, and M. F. Woodward during the third year.

The writer wishes to express his sincere appreciation to the farmers of Oxford County who have so willingly given the information which has made this study possible.

Parts of the material used in this publication were also presented to the Faculty of the Graduate School of Cornell University, January 1928, as a thesis, in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

Over 85 per cent of the apple trees were of bearing age, and 44.63 per cent of these trees were thirty years or over. There was a direct relationship between the age of bearing trees and the quantity of fruit produced. Trees under 15 years of age produced on an average .398 barrels per tree, or 61.51 per cent of the average production of trees of all ages; trees 15 to 24 years, .635 barrels, or 98.15 per cent; trees 25 to 34 years, .662 barrels, or 102.32 per cent; and trees 35 years and over, .897 barrels, or 138.64 per cent.

Thirty-three per cent of all the apple trees were in excellent condition, 35 per cent in fair or average condition, and 32 per cent in poor condition. The average production of bearing trees in excellent condition was .767 barrels per tree, or 118.55 per cent of the average production of trees of all conditions; trees in fair condition, .570 barrels, or 88.10 per cent; and trees in poor condition .433 barrels, or 66.92 per cent.

There was a direct relationship between age and condition of trees. Young trees usually begin life in prime condition, but as they mature and then grow old, they pass from "A" to "B" and then to "C" condition. Trees under good management remain in "A" condition much longer than those under poor management.

Fifty-one known varieties of apples were found on the farms included in this study. The principal apple varieties from the standpoint of total number of trees ranked as follows: Baldwin, McIntosh, Ben Davis, Stark, Wealthy, Northern Spy, R. I. Greening, Delicious, Gravenstein, and Snow. The trend is towards fewer commercial varieties. New plantings have been confined largely to McIntosh, Baldwin, Northern Spy, and Delicious.

There were large variations in the size of commercial orchards on the 93 farms included in the study. Sixteen growers had bearing orchards with less than 200 trees, 28 had orchards ranging from 200 to 399 trees, 20 had orchards ranging from 400 to 599 trees, 21 had orchards ranging from 600 to 999 trees, and 8 had orchards having over 1,000 trees. The average number of bearing trees per farm was 520.

Carefully managed orchards gave the largest yields per tree and the highest percentages of the better grades of apples.

Nearly 81 per cent of the apples were sold as marketable fruit, including canners; 12.34 per cent as cider apples; 6.82 per cent were consumed on the farms; and .21 per cent were lost by shrinkage. Under the above conditions of disposing of the apple crop the average net cost of producing and marketing apples was $1.95 per barrel. Of the gross cost of producing and marketing apples, 35.09 per cent was for human labor; 20.41 per cent for barrels; 11.96 per cent for interest; 8.73 per cent for fertilizers and manure; and the remaining 23.81 per cent for other costs.

The six varieties: Baldwin, Ben Davis, Stark, McIntosh, Northern Spy, and R. I. Greening, produced on an average, 89.50 per cent of the apples.

Growers followed the practice of selling most of their apples at harvest time or soon after. Over 81 per cent of the apples were sold each year before December 1.

Graded apples were marketed through the following channels of trade: to country buyers, export on commission, on commission in domestic markets, to city wholesalers or jobbers, to retailers, direct to consumers, through cooperative organizations, and to peddlers. Of the eight marketing channels through which graded apples were sold, the sales to country buyers were the most important. Sales through this marketing channel have declined during each succeeding year of the study.

There were wide variations in the prices received for apples by the different growers. The more important factors causing these variations were: variety of apples, grade, kind and quality of pack, time of sale, market sold to, and method of sale.

The more important farm enterprises in combination with orcharding were: sweet corn, potatoes, hay crops, dairying, and the keeping of poultry.

A small size farm business has relatively little opportunity for a large return and small chance for a large loss. A large size business has a greater opportunity for a larger gain as well as a larger loss.

Good production rates for crops and livestock are important factors in the success of farming. Farmers having crop indexes of less than 90 and gross returns from livestock of less than $75 per productive animal unit received poor labor incomes, averaging minus $225. Those having crop indexes of 111 and over and

gross returns from livestock of $126 and over per productive animal unit received relatively large labor incomes, averaging plus $753.

The adjustment of the farm enterprises is another very important factor in the success of farming. An ideal adjustment of farm enterprises is one that meets the following requirements: provides for the most efficient use of labor and machinery for the region and under the prevailing conditions; provides for the most effective use of the land area; provides for the keeping of sufficient livestock to most efficiently utilize the by-product feedstuffs produced on the farm; furnishes the most profitable use of farm manure and purchased fertilizers in the maintenance of soil fertility; provides for the most efficient use of farm buildings and equipment; furnishes an income fairly well distributed throughout the year; provides for a farm business in which the risks are reduced to a minimum.

Farmers operating the most successful farms had relatively large size businesses, good farm balances, high production rates for crops and livestock, good efficiency in labor and capital, and all the advantages of large and efficient farm businesses.

INTRODUCTION

Apple growing is one of the principal farming enterprises in Maine. This industry was founded by the early settlers when they planted farm orchards. These orchards were small and contained a large number of varieties. The only purpose of these small plantings was to supply apples for the home. Some of the farmers found it to their advantage to sell small quantities of the fruit during good apple years. The commercial apple industry developed, in the more favorable areas for apple growing, from this small beginning.

METHOD OF STUDY

The information for this study was obtained by the survey method. Personal visits were made during the summers of 1925, 1926, and 1927, to over 100 commercial[2] orchardists located in the

[2]A commercial orchardist, as defined for the purpose of this study, is a grower having 100 or more bearing trees.

towns of Buckfield, Hebron, Norway, Paris and Sumner, in Oxford County. The information collected includes detailed accounts of the farm businesses, giving special attention to orcharding for the crop years of 1924, 1925, and 1926. There were 93 growers who cooperated during each of the three years of the study. It is the results of the findings on these farms which are included in this publication.

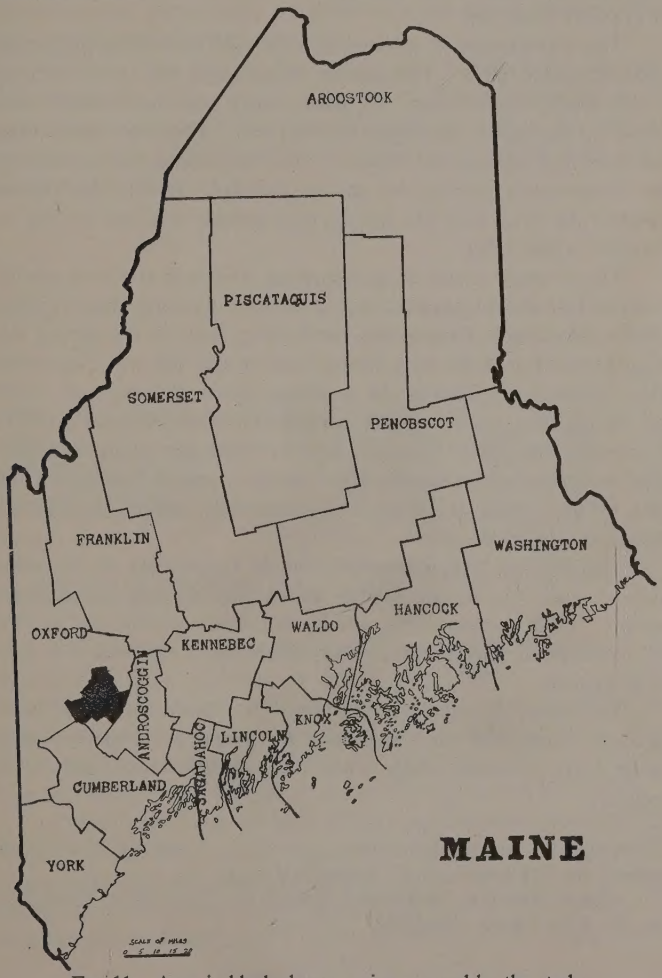

FIG. 11. Area in black shows region covered by the study.

PHYSICAL FACTORS OF AREA

The physical factors of the section studied are well adapted to the growing of a fairly large number of crops while the climatic conditions are favorable for livestock production. The soil type varies from a gravelly loam on the hills to a clay or sandy loam in the valleys. Nearly all of the apple orchards are located on hillsides in gravelly loam soil.

The topography is somewhat hilly and broken, giving many small irregular fields. The average elevation of the farms included in this study was 682 feet. In nearly every case the orchards were found on the higher elevations of the farm. There are many lakes scattered throughout the region. This has a tendency to equalize the temperature during the spring months. In the cool spring weather the fruit buds do not develop quickly and are seldom injured by a late frost.

The average length of the growing season in the area studied is from 120 to 140 days[3]. Over a period of twenty years (1895-1914) the average date of the last killing frost in the spring was May 11 to 21, and the first killing frost in the fall was September 21 to October 1. During the growing season the days are warm but the nights are cool. These atmospheric conditions are probably responsible for rather frequent showers which prevail in the region. Hail sometimes accompanies these storms, especially over a small area of the towns of Hebron and Buckfield, doing considerable damage to the apple crop.

The average annual precipitation is from forty to forty-five inches[4], with twenty-one inches of rainfall during the growing season. With the humidity, winds, sunshine, and amount of run-offs considered, this amount of precipitation is sufficient for good crop growth.

The above physical factors made it suitable for the growing of many crops. The more important of these are: grasses, apples, sweet corn, potatoes, silage corn, oats, small fruits, and truck crops.

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[3]Atlas of American Agriculture. Section 1. Frost and the Growing Season. By William G. Reed. Pages 10-11.

[4]Atlas of American Agriculture. Section A. Precipitation and Humidity. By J. B. Kincer. Pages 6-7.

FARM CAPITAL

During the three year period covered by this study ninety-two farms were operated by their owners, and one was operated on a salary basis. A total of 241 acres was cash rented during the crop years of 1924 and 1925 by three farmers. In 1926, two farmers cash rented 81 acres. There were 68 acres rented out by one farmer each of the three years. Farmers owned, on an average, 98.64 per cent of the land they operated.

The average size of the farms was 174.33 acres in 1924, 175.84 acres in 1925, and 174.76 acres in 1926. For the three year period an average of 39.02 acres, or 22.30 per cent of the land was in crops while 124.27 acres, or 71.02 per cent of the land was in pasture and woods.

TABLE 1

Size of Farms

	Average Acreage per Farm			3-year Average	
	1924	1925	1926	Acres	% of Total
Crops	38.69	39.57	38.81	**39.02**	22.30
Permanent Tillable Pasture	.70	1.92	1.81	**1.48**	.84
Other Permanent Pasture	5.35	5.49	5.77	**5.54**	3.17
Woods Pastured*	67.86	68.48	68.36	**68.24**	39.00
Woods not Pastured	50.28	48.85	47.91	**49.01**	28.01
Farmstead, Roads, etc.	11.45	11.53	12.10	**11.69**	6.68
Total	174.33	175.84	174.76	**174.98**	100.00

*Equivalent to (open pasture) 29.28 acres in 1924, 29.39 acres in 1925, and 29.12 acres in 1926, with an average of 29.26 acres for the three years.

The average total capital per farm for the three years was $7,592.06. This valuation consisted of $5,690.10 in real estate, $1,010.68 in livestock, $795.68 in machinery, and $95.60 in feed and supplies. Of the total capital 74.95 per cent was in real estate, 13.31 per cent in livestock, 10.48 per cent in machinery, and 1.26 per cent in feed and supplies. These data are given in Table 2.

The average value of all buildings per farm for the three year period was $2,047.31, or 35.98 per cent of the total real estate value. This valuation consisted of $1,137.38 for the main dwelling, $806.39 for main barn, and $103.54 for other buildings. The average value of land per farm was $3,642.79, or 64.02 per cent of

TABLE 2

Farm Capital

	Average Total Value			Three-year Average Value		
	1924–25	1925–26	1926–27	Total	per Farm	% of Total
Real Estate	$524,281	$528,850	$534,408	$529,180	$5,690.10	74.95
Livestock	94,122	95,672	92,185	93,993	1,010.68	13.31
Machinery	75,798	74,736	71,460	73,998	795.68	10.48
Feed & Supplies	9,553	9,069	8,053	8,891	95.60	1.26
Total Capital	$703,754	$708,327	$706,106	$706,062	$7,592.06	100.00

the total real estate value. This valuation consisted of $1,631.23 in orchard land, $682.53 in other crop land, $318.63 in pasture land, $798.57 in woodland not pastured, and $211.83 in woodland pastured. The value of orchard land represented 28.67 per cent of the total real estate value. The distribution of the real estate capital is given in Table 3.

TABLE 3

Distribution of Farm Real Estate Capital

	Average Total Value			Three-year Average Value		
	1924–25	1925–26	1926–27	Total	per Farm	% Real Estate
House No. 1	$102,614	$106,178	$108,540	$105,777	$1,137.38	19.99
House No. 2	2,000	2,600	3,200	2,600	27.96	.49
Barn No. 1	73,342	75,410	76,230	74,994	806.39	14.17
Barn No. 2	1,450	1,600	1,750	1,600	17.20	.30
Other Buildings	4,125	5,262	6,900	5,429	58.38	1.03
Total Value Buildings	183,531	191,050	196,620	190,400	2,047.31	35.98
Orchard	148,500	152,125	154,488	151,705	1,631.23	28.67
Other Crop Land	63,125	63,625	63,675	63,475	682.53	11.99
Pasture Land	29,000	28,800	31,100	29,633	318.63	5.60
Woodland	79,125	73,300	70,375	74,267	798.57	14.03
Woodland Pastured	21,000	19,950	18,150	19,700	211.83	3.73
Total Value Land	340,750	337,800	337,788	338,780	3,642.79	64.02
Total Value of Land and Buildings	$524,281	$528,850	$534,408	$529,180	$5,690.10	100.00

FARM RECEIPTS

The average receipts per farm were $2,847 in 1924-25, $2,715 in 1925-26, and $2,476 in 1926-27, which gave an average of $2,679 per farm for the three year period. The total receipts per farm show a decrease each succeeding year due mainly to a lower return from apples. This may be only a temporary condition. Growers in 1927 had a relatively small crop but received good prices for their apples.

The average receipts per farm for the three years were as follows: crop sales, including apples, $990.10, or 36.95 per cent of the total receipts; livestock sales, $324.42, or 12.11 per cent; livestock products receipts, $722.49, or 26.97 per cent; miscellaneous receipts, $486.08, or 18.14 per cent; and increases in capital, $156.22, or 5.83 per cent. These data are given in Table 4.

TABLE 4

Farm Receipts

	Total Receipts			Three-year Average Receipts		
	1924–25	1925–26	1926–27	Total	per Farm	% Total Receipts
Crop Sales	$108,835	$ 92,417	$ 74,985	$ 92,079	$ 990.10	36.95
Livestock Sales	30,705	30,016	29,793	30,171	324.42	12.11
Livestock Products Receipts	66,271	69,167	66,137	67,192	722.49	26.97
Miscellaneous Receipts	42,264	44,874	48,476	45,205	486.08	18.14
Increases in Capital	16,671	16,048	10,869	14,529	156.22	5.83
Total	$264,746	$252,522	$230,260	$249,176	$2,679.31	100.00

CROP SALES

The receipts from apples per farm for the three year period averaged $725.69, or 73.29 per cent of the total crop receipts. The receipts from apples, potatoes, and sweet corn comprised 94.94 per cent of the total crop sales.

The acreage of each crop grown during the three year period is shown in Table 6. The principal crops were: mixed grasses, apples, sweet corn, and potatoes. These crops comprised 95.56 per cent of the crop acreage for the three year period. The acreage of small grains was relatively unimportant.

TABLE 5

Crop Sales

Crop	Crop Sales			Three-year Average		
	1924–25	1925–26	1926–27	Total	per Farm	% of Total Sales
Sweet Corn	$ 9,149	$ 9,344	$ 9,400	$ 9,298	$ 99.98	10.10
Hay	1,339	1,023	533	965	10.38	1.05
Oats	——	——	32	11	.12	.01
Potatoes	5,809	11,559	14,547	10,638	114.39	11.55
Field Beans	286	279	390	318	3.42	.35
Factory Beans	612	296	224	377	4.05	.41
Apples	89,286	65,507	47,672	67,489	725.69	73.29
Other Tree Fruit	768	1,514	473	918	9.87	1.00
Small Fruit	687	666	617	657	7.06	.71
Truck Crops	899	2,229	1,097	1,408	15.14	1.53
Total	$108,835	$92,417	$74,985	$92,079	$990.10	100.00

TABLE 6

Crops Grown

Crop	Acres of Crops			Three-year Average		
	1924	1925	1926	Total	per Farm	% of Total
Corn for Grain	2.5	3.5	3.0	3.00	.03	.08
Corn for Silage	32.6	29.2	38.2	33.33	.36	.92
Sweet Corn	111.3	100.5	93.1	101.63	1.09	2.80
Fodder Corn	2.0	8.7	9.2	6.63	.07	.18
Oats	6.5	21.0	16.5	14.67	.16	.40
Buckwheat	1.0	——	——	.33	——	.01
Mixed Hay	2,685.5	2,799.6	2,795.1	2,760.07	29.70	76.07
New Seeding Hay	148.5	74.5	102.0	108.33	1.16	2.98
Alfalfa	.8	1.2	——	.67	——	.02
Oat Hay	70.0	45.5	59.5	58.33	.63	1.61
Barley Hay	3.0	——	9.5	4.17	.04	.11
Potatoes	63.1	51.9	63.3	59.43	.64	1.64
Field Beans	4.6	1.5	4.9	3.67	.04	.10
Factory Beans	4.2	1.5	——	1.90	.02	.05
Hungarian Grass	1.8	1.2	2.0	1.67	.02	.05
Millet	10.2	7.7	4.5	7.47	.08	.21
Oats Fed Green	6.5	7.0	12.8*	8.77	.09	.24
Truck Crops	6.2	8.5	6.5	7.06	.08	.19
Small Fruits	10.4	11.5	10.1	10.67	.11	.29
Orchard†	427.5	435.0	450.0	437.50	4.70	12.05
Total	3,598.2	3,609.5	3,680.2	3,629.30	39.02	100.00

*Two acres of oats put in silo.

†It was found exceedingly difficult to obtain an accurate estimate of the acres in the orchards from the farmers. Many trees are scattered along by the stone walls and fences of the farms. These trees are often too close together to furnish normal tree growth.

The more easily worked soils, found usually on the higher elevations, were used for cultivated crops and apple trees, while the clay soils and rocky fields were kept in grass crops many years.

The average yield per acre for the more important crops for the three year period is shown in Table 7. The average yield per acre for apples (estimating 50 trees to the acre) was 32.33 bbls.; for sweet corn, 1.15 tons; for mixed hay, 1.09 tons; for new seeding hay, 1.98 tons; for oat hay, 2.43 tons; and for potatoes, 198.70 bushels.

TABLE 7

Average Yield of Important Crops

Crop	Unit	Yield per Acre			
		1924	1925	1926	Three-year Average
Apples	Barrel	37.75	34.20	25.05	32.33
Sweet Corn	Ton	1.04	1.15	1.27	1.15
Potatoes	Bushel	198.11	173.53	224.45	198.70
Mixed Hay	Ton	1.12	1.09	1.07	1.09
New Seeding Hay	Ton	1.98	2.08	1.88	1.98
Oat Hay	Ton	2.28	2.60	2.42	2.43

LIVESTOCK SALES

The large acreage of land which could not be profitably utilized for the growing of cultivated crops, and which was not wooded, furnished good pasturage for livestock. Dairying ranked second to orcharding among the farm enterprises from the standpoint of gross receipts.

In Table 8 are shown the inventories, purchases, sales, and deaths of all classes of livestock for each of the three years. The average number of the more important animals per farm for this period (1924-27) is shown in Table 9.

TABLE 8

Summary of Livestock on Farms in 1924-25

Kind	April 1, 1924			Purchases			Sales			March 31, 1925			Died	Eaten	
	Farms	Head	Value	Farms	Head	Value	Farms	Head	Value	Farms	Head	Value		Head	Value
Cows {Grade	86	619	$34,096	18	34	$2,079	55	157.75	$ 9,460	87	615	$34,164	1	1.25	$ 65
Cows {Purebred	9	45	4,910	—	—	—	4	12	1,285	9	45	4,815	2	—	—
Heifers {Grade	64	284	7,501	4	7	220	7	11	292	67	284	8,101	4	—	—
Heifers {Purebred	6	49	3,015	2	7	390	—	—	—	8	62	3,960	—	—	—
Veal Calves	—	—	—	4	15	34	69	364	5,102	3	10	145	—	—	—
Bulls {Grade	17	19	533	5	5	110	5	4.75	178	15	19	645	1	.25	8
Bulls {Purebred	32	34.3	2,375	10	10	470	11	12	725	34	36.3	2,665	1	2.00	105
Beef Cattle	4	37	1,795	1	1	50	2	8	407	4	38	2,025	—	—	—
Oxen	2	4	445	2	4	400	1	2	245	2	6	725	—	—	—
Horses*	89	215	26,310	19	28	3,970	11	14	1,370	89	220	26,700	9	—	—
Colts	3	3	135	—	—	—	—	—	—	3	3	200	—	—	—
Ewes	12	177	1,745	2	52	480	4	25	164	11	245	2,323	4	—	—
Bucks	5	6	71	—	—	—	—	—	—	7	11	132	1	—	—
Lambs	3	8	18	1	1	3	7	69	634	3	10	24	1	3.00	15
Brood Sows	24	48	1,315	1	1	30	14	24	768	22	44	1,480	1	1.00	30
Boars	9	9	216	2	2	21	2	2	71	11	11	253	—	1.00	35
Other Hogs	33	70	1,200	15	27	262	37	84.5	2,279	36	85	1,792	3	40.50	1,120
Pigs weaned	6	11	60	32	84	327	19	375	1,500	—	—	—	—	—	—
Hens	82	4,081	5,528	2	54	90	45	3,507	4,594	82	4,602	6,352	—	—	—
Chickens	—	—	—	—	—	—	17	3,305	1,433	—	—	—	—	—	—
Baby Chicks	—	—	—	15	1,775	347	1	1,100	198	1	12	2	—	—	—
Ducks	—	—	—	1	2	3	—	—	—	1	4	6	—	—	—
Turkeys	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Bantams	1	10	2	—	—	—	—	—	—	1	10	2	—	—	—
Bees (Hives)	10	21	217	1	1	14	—	—	—	10	25	246	3	—	—
Total			$91,487			$9,250			$30,705			$96,757			$1,378

*One Stallion.

Summary of Livestock on Farms in 1925-26 (continued)

Kind	April 1, 1925			Purchases			Sales			March 31, 1926			Died	Eaten	
	Farms	Head	Value	Farms	Head	Value	Farms	Head	Value	Farms	Head	Value		Head	Value
Cows (Grade)	87	615	$34,164	12	24	$1,290	62	160	$ 9,679	86	564	$32,785	5	1.00	$ 65
Cows (Purebred)	9	45	4,815	—	—	—	4	17	1,690	8	43	4,285	3	—	—
Heifers (Grade)	67	284	8,101	5	27	575	15	36	1,192	67	312	10,019	—	—	—
Heifers (Purebred)	8	62	3,960	—	—	—	4	14	810	7	45	2,565	1	—	—
Veal Calves	3	10	145	—	—	—	74	370	5,020	4	10	140	—	—	—
Bulls (Grade)	15	19	645	2	2	85	11	13	630	13	15	577	—	—	—
Bulls (Purebred)	34	36.3	2,665	9	9	455	13	13	865	27	31	2,390	1	4.30	65
Beef Cattle	4	38	2,025	2	6	275	2	9	440	5	41	2,390	—	—	—
Oxen	2	6	725	—	—	—	1	4	500	1	2	225	—	—	—
Horses	89	220*	26,700	13	14	1,615	11	12*	1,230	87	213	25,775	9	—	—
Colts	3	3	200	—	—	—	1	1	75	2	2	110	—	—	—
Ewes	11	245	2,323	1	1	6	3	13	132	11	268	2,579	2	—	—
Bucks	7	11	132	1	1	15	2	2	30	9	16	146	—	—	—
Lambs	3	10	24	—	—	—	4	22	149	6	66	280	—	—	—
Fattening Sheep	—	—	—	—	—	—	1	3	30	—	—	—	—	—	—
Brood Sows	22	44	1,480	5	7	131	11	21	852	22	37	1,450	—	5.00	220
Boars	11	11	253	—	—	—	5	5	189	5	5	155	1	1.00	10
Other Hogs	36	85	1,792	7	14	180	31	71.5	2,500	33	71	1,752	—	16.50	461
Pigs weaned	—	—	—	22	45	278	11	183	975	8	78	484	4	—	—
Hens	82	4,602	6,352	8	290	315	27	2,457	2,990	79	4,432	6,190	—	—	—
Chickens	—	—	—	—	—	—	1	50	32	2	85	98	—	—	—
Baby Chicks	1	12	2	3	550	110	—	—	—	—	—	—	—	—	—
Ducks	1	4	6	—	—	—	1	4	6	—	—	—	—	—	—
Turkeys	—	—	—	1	2	20	—	—	—	1	2	24	—	—	—
Bantams	1	10	2	—	—	—	—	—	—	1	8	2	2	—	—
Bees (Hives)	10	25	246	—	—	—	—	—	—	8	17	165	8	—	—
Total			$96,757			$5,350			$30,016			$94,586			$821

*One Stallion.

Summary of Livestock on Farms in 1926-27 (concluded)

Kind	April 1, 1926			Purchases			Sales			March 31, 1927			Died	Eaten	
	Farms	Head	Value	Farms	Head	Value	Farms	Head	Value	Farms	Head	Value		Head	Value
Cows {Grade	86	564	$32,785	21	42	$2,822	51	145.5	$ 9,154	85	529	$32,155	3	2.50	$ 110
Cows {Purebred	8	43	4,285	3	6	475	4	21	1,725	11	56	4,615	2	—	—
Heifers {Grade	67	312	10,019	2	2	57	21	50	1,693	63	279	9,016	3	1.00	45
Heifers {Purebred	7	45	2,565	1	2	130	3	7	310	9	28	1,335	—	—	—
Veal Calves	4	10	140	1	5	16	70	302	4,880	5	7	85	25	3.00	18
Bulls {Grade	13	15	577	5	5	177	7	8	349	14	15	670	1	—	—
Bulls {Purebred	27	31	2,390	7	7	357	11	11	741	24	28	2,327	—	—	—
Beef Cattle	5	41	2,390	—	—	—	4	12	785	3	35	2,405	—	1.00	50
Oxen	1	2	225	—	—	—	1	2	200	—	—	—	—	—	—
Horses	87	213	25,775	7	11	2,245	4	5	550	86	203	23,745	16	—	—
Colts	2	2	110	—	—	—	—	—	—	3	3	200	—	—	—
Ewes	11	268	2,579	6	55	458	4	54	436	16	309	2,980	14*	—	—
Bucks	9	16	146	2	2	55	3	5	39	8	22	190	3	—	—
Lambs	6	66	280	1	1	8	6	47	422	7	83	543	11*	—	—
Fattening Sheep	—	—	—	—	—	—	—	—	—	1	1	10	—	—	—
Brood Sows	22	37	1,450	3	3	160	5	8	340	30	77	2,217	—	1.00	30
Boars	5	5	155	3	3	48	1	1	40	9	9	202	—	—	—
Other Hogs	33	71	1,752	13	36	293	25	63.5	1,814	34	87	1,723	1	31.50	1,145
Pigs weaned	8	78	484	26	46	257	18	264	1,463	7	26	155	6	—	—
Hens	79	4,432	6,190	6	201	331	36	2,607	3,455	78	3,635	4,855	40†	—	—
Chickens	2	85	98	—	—	—	17	1,294	1,127	1	10	20	—	—	—
Baby Chicks	—	—	—	8	1,425	292	2	1,260	252	6	632	146	—	—	—
Ducks	—	—	—	1	5	5	—	—	—	1	5	5	—	—	—
Turkeys	1	2	24	1	7	35	1	2	18	1	7	35	—	—	—
Bantams	1	8	2	—	—	—	—	—	—	—	—	—	8	—	—
Bees (Hives)	8	17	165	—	—	—	—	—	—	8	16	150	2	—	—
Total			$94,586			$8,221			$29,793			$89,784			$1,398

*Killed by bears.
†Stolen.

TABLE 9

Average Number of More Important Animals per Farm

Kind	Average Number per Farm			Three-year Average
	1924-25	1925-26	1926-27	
Cows {Grade	6.63	6.34	5.87	6.28
Cows {Purebred	.48	.47	.54	.49
Heifers {Grade	3.05	3.20	3.18	3.15
Heifers {Purebred	.60	.58	.39	.52
Bulls {Grade	.20	.18	.16	.18
Bulls {Purebred	.38	.36	.32	.35
Horses	2.33	2.32	2.24	2.30
Brood Sows	.49	.43	.61	.51
Other Hogs	.84	.84	.85	.84
Poultry	46.69	48.57	43.38	46.22

The livestock sales per farm for the three year period averaged $324.42, and represented 12.11 per cent of the average total farm receipts. Total livestock sales were practically the same for each year. The more important livestock sales were as follows: grade and purebred cows, 36.47 per cent of the total; veal calves, 16.57 per cent; and poultry 15.55 per cent. The data on livestock sales are given in Table 10.

TABLE 10

Livestock Sales

Kind	Value Livestock Sales			Three-year Average		
	1924–25	1925–26	1926–27	Total	per Farm	% of Total
Cows {Grade	$ 9,460	$ 9,679	$ 9,154	$ 9,429	$101.41	31.27
Cows {Purebred	1,285	1,690	1,725	1,567	16.85	5.20
Heifers {Grade	292	1,192	1,693	1,059	11.39	3.53
Heifers {Purebred	—	810	310	373	4.01	1.25
Veal Calves	5,102	5,020	4,880	5,001	53.77	16.57
Bulls {Grade	178	630	349	386	4.14	1.28
Bulls {Purebred	725	865	741	777	8.36	2.58
Beef Cattle	407	440	785	544	5.85	1.81
Oxen	245	500	200	315	3.39	1.04
Horses	1,370	1,005	550	975	10.48	3.22
Stallions	—	225	—	75	.81	.25
Colts	—	75	—	25	.27	.08
Ewes	164	132	436	244	2.62	.81
Bucks	—	30	39	23	.25	.08
Lambs	634	149	422	402	4.32	1.33
Fattening Sheep	—	30	—	10	.11	.03
Brood Sows	768	852	340	653	7.03	2.16
Boars	71	189	40	100	1.07	.33
Other Hogs	2,279	2,500	1,814	2,198	23.63	7.28
Pigs weaned	1,500	975	1,463	1,313	14.11	4.35
Hens	4,594	2,990	3,455	3,680	39.57	12.17
Chickens	1,433	32	1,127	864	9.29	2.85
Baby Chicks	198	—	252	150	1.61	.50
Ducks	—	6	—	2	.02	.01
Turkeys	—	—	18	6	.06	.02
Total	$30,705	$30,016	$29,793	$30,171	$324.42	100.00

LIVESTOCK PRODUCTS RECEIPTS

The sale of livestock products averaged $722.49 per farm for each of the three years. Receipts from milk and cream averaged 66.51 per cent of the total sales; butter, 13.67 per cent; and market eggs, 18.27 per cent. Receipts from wool, hatching eggs, breeding fees, and honey were relatively unimportant.

TABLE 11

Livestock Products Receipts

Kind	Livestock Products Receipts			Three-year Average		
	1924–25	1925–26	1926–27	Total	per Farm	% of Total
Milk & Cream Wholesaled	$46,054	$44,533	$42,678	$44,422	$477.66	66.11
Milk & Cream Retailed	——	518	295	271	2.91	.40
Butter	7,430	10,112	10,016	9,186	98.77	13.67
Wool	533	681	595	603	6.48	.90
Eggs	11,939	12,966	11,919	12,275	131.99	18.27
Hatching Eggs	120	292	408	273	2.94	.41
Breeding Fees	190	65	201	152	1.63	.23
Honey	5	——	25	10	.11	.01
Total	$66,271	$69,167	$66,137	$67,192	$722.49	100.00

MISCELLANEOUS RECEIPTS

The average miscellaneous receipts per farm for the three year period were $486. Nearly 80 per cent of the total miscellaneous receipts were from outside labor, lumber, pulp, and wood. The data on miscellaneous receipts are given in Table 12.

INCREASES IN CAPITAL

The average gross increase in capital per farm for the three year period was $156.22. However, the average net increase was only $6.54 per farm.

FARM EXPENSES

The average farm expenses per farm were $2,195.51 in 1924-25, $2,163.72 in 1925-26, $2,018.33 in 1926-27, which gave an average of $2,125.85 per farm for the three years. Of this amount, $81.80 was for livestock purchased, $1,894.37 for general farm expenses, and $149.68 to cover the decreases in capital.

TABLE 12

Miscellaneous Receipts

Kind	Miscellaneous Receipts			Three-year Average		
	1924–25	1925–26	1926–27	Total	per Farm	% of Total
Outside Labor	$10,361	$13,911	$17,508	$13,926.67	$149.75	30.82
Machinery Rental	7	30	317	118.00	1.27	.26
Pasture Rental	—	20	—	6.67	.07	.01
Building Rental	—	—	100	33.33	.36	.07
Land Rental	50	50	50	50.00	.54	.11
Lumber	8,935	4,655	5,366	6,318.67	67.94	13.98
Pulp	7,177	6,265	7,242	6,894.67	74.14	15.25
Wood	5,714	11,866	8,635	8,738.33	93.96	19.33
Sawing Wood	310	—	—	103.33	1.11	.23
Stock Pastured	146	120	209	158.33	1.70	.35
Barrels	39	61	34	44.67	.48	.10
Hail Insurance	685	1,690	325	900.00	9.68	1.99
Fire Insurance	—	—	4,655	1,551.67	16.68	3.43
Maple Syrup	725	593	648	655.33	7.05	1.45
Custom Cider Making	885	50	50	328.33	3.53	.73
Fair Premiums {Apples	306	—	156	154.00	1.66	.34
Fair Premiums {Others	90	—	73	54.33	.58	.12
Apple Scions	—	—	40	13.33	.14	.03
Feed Bags	—	—	108	36.00	.39	.08
Grafting Wax	—	75	185	86.67	.93	.19
Gravel	95	—	—	31.67	.34	.07
Cutting Ice	150	75	—	75.00	.81	.17
Hides	7	5	36	16.00	.17	.03
Manure	20	—	19	13.00	.14	.03
From State for Sheep*	—	—	300	100.00	1.08	.22
All Others	6,562	5,408	2,420	4,796.67	51.58	10.61
Total	$42,264	$44,874	$48,476	$45,204.67	$486.08	100.00

*State paid $10 a head for 30 sheep killed by bears.

TABLE 13

Farm Expenses

	Total Farm Expenses			Three-year Average		
	1924–25	1925–26	1926–27	Total	per Farm	% of Total
Livestock Purchased	$ 9,250	$ 5,350	$ 8,221	$ 7,607	$ 81.80	3.85
Gen. Farm Expenses	184,530	182,706	161,294	176,177	1,894.37	89.11
Decreases in Capital	10,402	13,170	18,190	13,920	149.68	7.04
Total	$204,182	$201,226	$187,705	$197,704	$2,125.85	100.00

LIVESTOCK PURCHASED

The purchase of cows and horses comprised 63.54 per cent of the total amount expended for livestock,

TABLE 14

Livestock Purchased

Kind	Value Livestock Purchased			Three-year Average		
	1924–25	1925–26	1926–27	Total	per Farm	% of Total
Cows {Grade	$2,079	$1,290	$2,822	$2,064	$22.19	27.13
Cows {Purebred	—	—	475	158	1.70	2.08
Heifers {Grade	220	575	57	284	3.05	3.73
Heifers {Purebred	390	—	130	173	1.86	2.27
Veal Calves	34	—	16	17	.18	.22
Bulls {Grade	110	85	177	124	1.33	1.63
Bulls {Purebred	470	455	357	427	4.59	5.61
Beef Cattle	50	275	—	108	1.16	1.42
Oxen	400	—	—	133	1.43	1.75
Horses	3,970	1,615	2,245	2,611	28.11	34.33
Ewes	430	6	458	298	3.20	3.92
Bucks	—	15	55	23	.25	.30
Lambs	3	—	8	4	.04	.05
Brood Sows	30	131	160	107	1.15	1.41
Boars	21	—	48	23	.25	.30
Other Hogs	262	180	293	245	2.63	3.22
Pigs weaned	327	278	257	287	3.09	3.77
Hens	90	315	331	245	2.63	3.22
Baby Chicks	347	110	292	250	2.69	3.29
Ducks	3	—	5	3	.03	.04
Turkeys	—	20	35	18	.19	.24
Bees	14	—	—	5	.05	.07
Total	$9,250	$5,350	$8,221	$7,607	$81.80	100.00

GENERAL FARM EXPENSES

Of the general farm expenses, including new buildings, feed represented 28.00 per cent; labor, 26.82 per cent; barrels and baskets, 7.82 per cent; taxes, 7.79 per cent; farm use of auto, 6.12 per cent; and other expenses, 23.45 per cent. Detailed data are given in Table 15.

DECREASES IN CAPITAL

The gross decreases in capital amounted to $10,402 in 1924-25, $13,170 in 1925-26, and $18,190 in 1926-27. After deducting the gross decreases in capital from the gross increases for the three years, there was an average net increase in capital of $6.54 per farm.

TABLE 15

General Farm Expenses

	General Farm Expenses			Three-year Average		
	1924–25	1925–26	1926–27	Total	per Farm	% of Total
Hired Labor	$ 20,247	$ 27,346	$ 23,684	$ 23,759	$ 255.47	13.49
Board of Hired Labor	4,973	5,030	6,188	5,397	58.03	3.06
Unpaid Labor	21,637	16,775	15,894	18,102	194.65	10.27
Hauling Apples	1,147	383	96	542	5.83	.31
Barrels & Heads	16,120	14,850	9,218	13,396	144.04	7.60
Baskets	346	400	381	379	4.08	.22
Bags, crates, etc.	17	31	70	39	.42	.02
Spray & Dust Materials	3,540	2,820	3,178	3,178	34.17	1.80
Breeding Fees	174	134	231	180	1.94	.10
New Buildings	925	2,925	1,860	1,903	20.46	1.08
Building Repairs	6,256	4,323	4,585	5,055	54.35	2.87
Land Rental	326	50	62	146	1.57	.08
Pasturage Rent	27	25	105	52	.56	.03
Land Purchased	—	6,000	500	2,167	23.30	1.23
Express & Freight	376	339	204	306	3.29	.17
Hay, Silage, etc.	509	394	555	486	5.23	.28
Feeds & Grain for Stock	48,399	51,480	48,117	49,332	530.45	28.00
Veterinary Fees	151	109	180	147	1.58	.08
Fence, Posts, etc.	572	627	240	480	5.16	.27
Fertilizer	5,522	4,400	4,655	4,858	52.24	2.76
Lime	351	38	70	153	1.64	.09
Manure	—	25	—	8	.09	—
Horseshoeing	2,120	2,112	2,193	2,142	23.03	1.22
Insurance	1,582	1,612	1,709	1,634	17.57	.93
Lumber Sawing	1,342	1,486	905	1,244	13.38	.71
Cutting and Sawing Wood	4,897	105	342	1,781	19.15	1.01
New Machinery	6,862	5,126	2,973	4,987	53.62	2.83
Machinery Repairs	1,743	1,272	1,181	1,399	15.04	.79
Hired Machines	392	144	136	224	2.41	.13
Silo Filling	395	160	388	311	3.34	.18
Threshing	7	67	107	60	.64	.03
Twine	15	3	5	8	.09	—
Coal, Oil, & Gasoline	851	1,923	1,220	1,331	14.31	.76
Farm Use of Auto	11,380	10,732	10,212	10,775	115.86	6.12
Ice	510	435	595	513	5.52	.29
Dairy Supplies	778	655	439	624	6.71	.35
Milk Hauling	233	205	124	187	2.01	.11
Grass Seed	703	469	790	634	6.82	.36
Fruit Trees	790	270	410	490	5.27	.28
Other Seeds	717	753	572	681	7.32	.39
Water	8	8	8	8	.09	—
Electric Lights	106	70	75	84	.90	.05
Advertising	22	2	3	12	.13	.01
Telephone	918	1,122	1,235	1,092	11.74	.62
Taxes	13,560	13,855	13,759	13,717	147.49	7.79
Other Expenses	2,302	1,728	1,821	2,174	23.38	1.23
Total	$184,530	$182,706	$161,294	$176,177	$1,894.37	100.00

LABOR INCOME

The average receipts per farm for the three years were $2,679.31, the expenses $2,125.85, and the farm income, or the difference between receipts and expenses, $553.46. The interest on the average investment was $379.60, which, when deducted from the farm income, leaves $173.86 as an average labor income for the operator each year.

Labor incomes ranged from minus $1,469 to plus $4,521 in 1924-25; from minus $2,356 to plus $2,987 in 1925-26; and from minus $2,134 to plus $3,366 in 1926-27. For the three year period, 41.51 per cent of the operators received a minus labor income (a return which failed to yield 5 per cent interest on their investments), 48.06 per cent received a labor income ranging from $1 to $1,000, and only 10.43 per cent made more than $1,000 as a labor income.

TABLE 16

Financial Summary

	1924-25	1925-26	1926-27	Three-year Average	Average per Farm	% of Total
Average Capital						
Real Estate	$524,281	$528,850	$534,408	$529,180	$5,690.10	74.95
Livestock	94,122	95,672	92,185	93,993	1,010.68	13.31
Machinery	75,798	74,736	71,460	73,998	795.68	10.48
Feed & Supplies	9,553	9,069	8,053	8,891	95.60	1.26
Total Capital	703,754	708,327	706,106	706,062	7,592.06	100.00
Receipts						
Crop Sales	108,835	92,417	74,985	92,079	990.10	36.95
Livestock Sales	30,705	30,016	29,793	30,171	324.42	12.11
Livestock Products Receipts	66,271	69,167	66,137	67,192	722.49	26.97
Miscellaneous Receipts	42,264	44,874	48,476	45,205	486.08	18.14
Increase in Capital	16,671	16,048	10,869	14,529	156.22	5.83
Total Receipts	264,746	252,522	230.260	249,176	2,679.31	100.00
Expenses						
Livestock Purchased	9,250	5,350	8,221	7,607	81.80	3.85
General Farm Expenses	184,530	182,706	161,294	176,177	1,894.37	89.11
Decrease in Capital	10,402	13,170	18,190	13,920	149.68	7.04
Total Expenses	204,182	201,226	187,705	197,704	2,125.85	100.00
Farm Income	60,564	51,296	42,555	51,472	553.46	
Interest on Capital	35,188	35,416	35,305	35,303	379.60	
Total Labor Income	25,376	15,880	7,250	16,169	173.86	
Labor Income* per farm	$ 272.86	$ 170.75	$ 77.96			

*Labor income is the amount a farmer receives for his year's work after all farm expenses, including interest on his investment at 5 per cent, have been deducted. This income is in addition to having the use of a house to live in and farm products for home consumption.

TABLE 17

Variation in Labor Incomes on 93 Farms for Three Years

Size of Labor Income	Number of Farmers			Three-year Average
	1924-25	1925-26	1926-27	
—1,000 & More	4	8	6	6.0
— 500 — —999	9	10	14	11.0
0 — —499	28	18	19	21.6
+ 1 — 500	16	30	32	26.0
+ 501 — 1,000	24	17	15	18.7
+1,001 — 1,500	5	5	4	4.7
+1,501 — 2,000	3	3	2	2.7
+2,001 — 2,500	2	1	—	1.0
+2,500 & Over	2	1	1	1.3
Total	93	93	93	93.0

APPLE INDUSTRY

According to the United States Agricultural Census of 1925, there were 2,921 farms in Oxford County with an average of 123 apple trees per farm. Orchards on the farms included in this study averaged, for the three-year period, 608 trees (520 bearing and 88 non-bearing trees) per farm. In Table 18 it is shown that data were obtained on 29.02 per cent of the bearing, and 27.84 per cent of the non-bearing trees located in the area where the study was made.

TABLE 18

Average Number of Bearing and Non-Bearing Trees Included in Study, by Towns

Town	Farms	Trees Included in Study Three-yr. Average		Per cent of Total Trees in 1925	
		Bearing	Non-bearing	Bearing	Non-bearing
Buckfield	15	6,235	1,193	18.85	22.06
Hebron	13	8,789	1,442	26.05	25.37
Norway	17	9,082	2,212	46.08	42.36
Paris	28	15,431	1,872	29.48	21.48
Sumner	20	8,828	1,429	31.76	33.70
Total	93	48,365	8,148	Av. 29.02	Av. 27.84

NUMBER, AGE, AND CONDITION OF TREES

There were, on the average, for the three-year period, 8,148 trees, or 14.42 per cent of the total trees, not yet in bearing; and 48,365 trees, or 85.58 per cent of the total trees, in bearing; on the 93 farms included in this study.

TABLE 19

Number of Bearing and Non-Bearing Trees of Different Ages

Age of Trees	1924		1925		1926		Three-yr. Av.	
	Trees	% Total Trees	Trees	% Total Trees	Trees	% Total Trees	Trees	% Total Trees
Non-bearing Trees								
Under 5 years	6,442	11.56	6,407	11.41	5,363	9.31	6,071	10.75
5 – 8 years	1,173	2.10	1,394	2.48	2,776	4.82	1,781	3.15
9 years & over	384	.69	434	.77	70	.12	296	.52
Total Non-bearing	7,999	14.35	8,235	14.66	8,209	14.25	8,148	14.42
Bearing Trees								
Under 10 years	2,068	3.71	2,170	3.86	2,336	4.06	2,191	3.88
10 – 14 years	5,819	10.44	5,785	10.30	6,105	10.60	5,903	10.44
15 – 19 years	7,782	13.96	7,434	13.23	7,981	13.85	7,732	13.68
20 – 24 years	5,380	9.65	5,717	10.18	5,916	10.27	5,671	10.03
25 – 29 years	5,328	9.56	5,598	9.96	4,924	8.55	5,283	9.35
30 – 34 years	7,458	13.38	7,458	13.28	8,192	14.22	7,703	13.63
35 – 39 years	5,583	10.01	5,201	9.26	4,650	8.07	5,145	9.10
40 years & over	8,338	14.94	8,580	15.27	9,292	16.13	8,737	15.47
Total Bearing	47,756	85.65	47,943	85.34	49,396	85.75	48,365	85.58
Total	55,755	100.00	56,178	100.00	57,605	100.00	56,513	100.00

The average number of non-bearing trees in the various age groups was as follows: 6,071 trees under 5 years; 1,781 trees 5 to 8 years; and 296 trees 9 years and over. Of the total non-bearing trees, 74.51 per cent were under 5 years; 21.86 per cent, 5 to 8 years; and 3.63 per cent 9 years and over.

Of the average total number of bearing trees, there were 2,191 trees, or 4.53 per cent of the bearing trees, under 10 years; 5,903 trees, or 12.20 per cent, 10 to 14 years; 7,732 trees, or 15.99 per cent, 15 to 19 years; 5,671 trees, or 11.72 per cent, 20 to 24 years; 5,283 trees, or 10.92 per cent, 25 to 29 years; 7,703 trees, or 15.93 per cent, 30 to 34 years; 5,145 trees, or 10.64 per cent, 35 to 39 years; and 8,737 trees, or 18.07 per cent, 40 years and over.

There was a direct relationship between the age of bearing trees and the quantity and quality of fruit produced. Young trees, having a smaller bearing surface, produced a smaller quantity of fruit, but usually the apples were larger and more highly colored than those grown on older trees of the same variety under similar conditions.

In Table 20 are shown the average production rates per tree according to age. To give the rates greater significance, two age groups were averaged and trees of all varieties included. Bearing trees under 15 years of age produced, on an average, .398 barrels per tree, or 61.51 per cent of the average production of trees of all ages; trees 15 to 24 years, .635 barrels, or 98.15 per cent; trees 25 to 34 years, .662 barrels, or 102.32 per cent; and trees 35 years and over, .897 barrels, or 138.64 per cent. One should bear in mind that some varieties come into bearing earlier than others, and that some varieties are more prolific bearers than others.

TABLE 20

Production Rates (bbls.) per Tree by Age Groups for All Varieties

Age of Trees	Production per Tree				
	1924	1925	1926	Three-year Average	% of Average Production
Under 15 years	.393	.486	.315	.398	61.51
15 – 24 years	.637	.735	.534	.635	98.15
25 – 34 years	.856	.709	.420	.662	102.32
35 yrs. & over	1.039	.887	.764	.897	138.64
Average	.755	.684	.501	.647	100.00

The physical condition of bearing trees was found to be a very important factor in the production of apples. Trees in poor condition produced a relatively light crop of apples as compared with trees in excellent condition. A tree may be in poor condition as a result of any one or combination of a large number of causes, the more important of which are: poor management, insect injury, disease, winter injury, over-loading of fruit, insufficient nourishment, or old age.

The trees included in this study were classified as to condition: A, B, and C. An "A" condition tree was one in prime or

excellent condition; a "B", one which was in fair or average condition; and a "C", one in poor or injured condition.

The three-year average of all trees shows that 33.05 per cent were in "A" condition, 34.97 per cent in "B" condition, and 31.98 per cent in "C" condition. The data for each of the three years, and the average are given in Table 21.

TABLE 21

Condition of Bearing and Non-Bearing Trees

Condition	1924			1925		
	Bearing Trees	Non-bearing Trees	Total Trees	Bearing Trees	Non-bearing Trees	Total Trees
A	13,098	5,131	18,229	13,003	5,443	18,446
B	17,257	2,325	19,582	17,350	2,249	19,599
C	17,401	543	17,944	17,590	543	18,133
Total	47,756	7,999	55,755	47,943	8,235	56,178

Condition	1926			Three-year Average			
	Bearing Trees	Non-bearing Trees	Total Trees	Bearing Trees	Non-bearing Trees	Total Trees	% of Total Trees
A	13,646	5,712	19,358	13,249	5,429	18,678	33.05
B	18,064	2,041	20,105	17,557	2,205	19,762	34.97
C	17,686	456	18,142	17,559	514	18,073	31.98
Total	49,396	8,209	57,605	48,365	8,148	56,513	100.00

The average production of "A" condition trees for the three-year period was .767 barrels per tree, or 118.55 per cent of the average production of trees of all conditions; "B" condition trees, .570 barrels, or 88.10 per cent; and "C" condition trees, .433 barrels, or 66.92 per cent. In the computation of these rates of production and percentage figures, the effect of age of trees upon production has not been eliminated, but weights have been so applied that age has influenced each average to a like amount.[5]

[5]For method of computation see Maine Agricultural Experiment Station Bulletin 339. Page 154. By Charles H. Merchant.

TABLE 22

Production Rates (bbls.) per Tree by Condition Groups for All Varieties

Condition	Production per Tree				% of Average Production
	1924	1925	1926	Three-year Average	
A	.750	.855	.696	.767	118.55
B	.682	.555	.474	.570	88.10
C	.549	.446	.304	.433	66.92
Average	.755	.684	.501	.647	100.00

There was a direct relationship between the age and condition of trees as shown in Table 23. Young trees usually begin life in prime condition, but as they mature and then grow old, they pass from "A" to "B" and then to "C" condition. Trees under good management remain in "A" condition much longer than those under poor management.

Special attention in the care and management of young trees is very important. Thrifty young trees make the maximum growth development and will be in good or excellent condition, barring unforeseen injury, when they come into full bearing; while young trees which are given little or no attention fail to make the proper development and will not be in the best productive condition when of mature age. It is much more difficult to bring poor trees into good condition than it is to maintain good thrifty trees.

The information on age and condition of trees for the more important varieties for the year 1926 is given in Table 24. In Table 25 is shown the principal varieties of apples arranged according to total number of trees. The varietal trends during the three years of the study are shown in Table 26.

Principal Apple Varieties

In the discussion of apple varieties the data for 1926 are used as the basis (Table 24). The information for 1924 and 1925 is used to show changes in relative importance of varieties (Tables 25 and 26).

TABLE 23

Relationship Between Age and Condition of Trees

Age of Trees	1924				1925				1926				Three-year Average			
	Condition			Total Trees	Condition			Total Trees	Condition			Total Trees	Condition			Total Trees
	A	B	C		A	B	C		A	B	C		A	B	C	
Non-bearing Trees																
Under 5 years	4,159	1,893	390	6,442	4,338	1,679	390	6,407	4,229	890	244	5,363	4,243	1,487	341	6,071
5 – 8 years	597	432	144	1,173	730	520	144	1,394	1,438	1,126	212	2,776	921	693	167	1,781
9 years & over	375	—	9	384	375	50	9	434	45	25	—	70	265	25	6	296
Bearing Trees																
Under 10 years	1,791	187	90	2,068	1,801	199	170	2,170	1,467	656	213	2,336	1,686	247	158	2,191
10 – 14 years	3,288	2,024	507	5,819	3,038	2,149	598	5,785	3,901	1,817	387	6,105	3,409	1,997	497	5,903
15 – 19 years	3,284	2,957	1,541	7,782	3,359	2,629	1,446	7,434	3,644	3,213	1,124	7,981	3,429	2,933	1,370	7,732
20 – 24 years	1,180	3,370	830	5,380	1,173	3,500	1,044	5,717	1,185	3,237	1,494	5,916	1,179	3,369	1,123	5,671
25 – 29 years	1,261	1,870	2,197	5,328	1,268	2,133	2,197	5,598	1,113	2,066	1,145	4,924	1,214	2,223	1,846	5,283
30 – 34 years	1,388	2,707	3,363	7,458	1,163	2,932	3,363	7,458	1,105	2,398	4,689	8,192	1,219	2,679	3,805	7,703
35 – 39 years	742	1,872	2,969	5,583	812	1,357	3,032	5,201	600	1,539	2,511	4,650	718	1,589	2,838	5,145
40 years & over	164	2,270	5,904	8,338	389	2,451	5,740	8,580	631	2,538	6,123	9,292	395	2,420	5,922	8,737
Total	18,229	19,582	17,944	55,755	18,446	19,599	18,133	56,178	19,358	20,105	18,142	57,605	18,678	19,762	18,073	56,513

TABLE 24

Age and Condition of Bearing and Non-Bearing Trees by Varieties for 1926

Variety	Number of Bearing Trees								% Total Bearing Trees	Number of Non-bearing Trees				% Non-Bearing Trees
	Under 10 yrs.	10–14 years	15–19 years	20–24 years	25–29 years	30–34 years	35–39 years	40 yrs. & over	Total		Under 5 yrs.	5–8 years	9 yrs. & over	Total	
WINTER VARIETIES															
Baldwin															
Condition A	287	450	1,200	310	400	950	100	450	4,147	8.40	587	525	37	1,149	13.99
Condition B	175	380	1,485	633	1,855	1,825	1,135	1,877	9,365	18.96	250	265	25	540	6.58
Condition C	175	247	175	340	510	3,716	1,593	4,126	10,882	22.03	70	—	—	50	.61
Total	637	1,077	2,860	1,283	2,765	6,491	2,828	6,453	24,394	49.39	887	790	62	1,739	21.18
Ben Davis															
Condition A	—	31	875	175	280	125	—	100	1,586	3.21	—	—	—	—	—
Condition B	6	225	380	1,597	420	90	1	61	2,780	5.63	—	25	—	25	.30
Condition C	—	—	290	811	215	283	394	395	2,388	4.83	—	—	—	—	—
Total	6	256	1,545	2,583	915	498	395	556	6,754	13.67		25		25	.30
Stark															
Condition A	135	200	300	565	75	—	400	—	1,675	3.39	60	43	—	103	1.25
Condition B	—	90	473	382	65	—	—	6	1,016	2.06	—	—	—	—	—
Condition C	—	—	350	105	112	93	65	32	757	1.53	—	—	—	—	—
Total	135	290	1,123	1,052	252	93	465	38	3,448	6.98	60	43		103	1.25
Northern Spy															
Condition A	32	135	145	35	—	—	100	69	516	1.04	200	—	—	200	2.44
Condition B	70	102	45	58	25	—	—	233	533	1.09	225	—	—	225	2.74
Condition C	—	30	46	—	3	35	47	240	401	.81	—	—	—	—	—
Total	102	267	236	93	28	35	147	542	1,450	2.94	425			425	5.18
R. I. Greening															
Condition A	—	7	80	—	—	—	—	—	87	.18	150	—	—	150	1.83
Condition B	—	10	10	39	55	—	176	167	457	.92	—	—	—	—	—
Condition C	—	—	20	—	—	77	84	288	469	.95	—	—	—	—	—
Total		17	110	39	55	77	260	455	1,013	2.05	150			150	1.83

Age and Condition of Bearing and Non-Bearing Trees by Varieties for 1926 (continued)

Variety	Number of Bearing Trees									% Total Bearing Trees	Number of Non-bearing Trees				% Non-Bearing Trees
	Under 10 yrs.	10–14 years	15–19 years	20–24 years	25–29 years	30–34 years	35–39 years	40 yrs. & over	Total		Under 5 yrs.	5–8 years	9 yrs. & over	Total	
Delicious															
Condition A	20	54	25	—	—	—	—	—	99	.20	467	6	—	473	5.76
Condition B	—	50	85	—	—	—	—	—	135	.27	10	—	—	10	.12
Condition C	—	—	—	—	—	—	—	—	—	—	—	50	—	50	.61
Total	20	104	110						234	.47	477	56		533	6.49
Gano															
Condition A	25	45	20	—	—	—	—	—	90	.18	25	—	—	25	.30
Condition B	—	—	56	5	—	—	1	—	62	.13	—	—	—	—	—
Condition C	—	—	74	85	12	—	—	—	171	.34	—	—	—	—	—
Total	25	45	150	90	12		1		323	.65	25			25	.30
Harvey Greening															
Condition A	—	—	—	—	—	30	—	—	30	.06	—	—	—	—	—
Condition B	—	25	—	—	—	—	34	8	67	.14	—	—	—	—	—
Condition C	—	—	7	—	—	—	—	100	107	.21	—	100	—	100	1.22
Total		25	7			30	34	108	204	.41		100		100	1.22
Cortland															
Condition A	—	—	—	—	—	—	—	—	—	—	186	—	—	186	2.26
Condition B	—	—	—	—	—	—	—	—	—	—	100	—	—	100	1.22
Condition C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total											286			286	3.48
Tolman Sweet															
Condition A	—	—	—	—	20	—	—	12	32	.06	—	—	—	—	—
Condition B	—	—	100	—	8	—	—	14	122	.25	—	—	—	—	—
Condition C	—	—	—	—	20	10	6	64	100	.20	—	—	—	—	—
Total			100		48	10	6	90	254	.51					
Milden															
Condition A	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condition B	—	—	—	—	—	—	90	—	90	.18	—	—	—	—	—
Condition C	—	—	—	—	—	110	25	—	135	.28	—	—	—	—	—
Total						110	115		225	.46					

Age and Condition of Bearing and Non-Bearing Trees by Varieties for 1926 (continued)

Variety	Number of Bearing Trees									% Total Bearing Trees	Number of Non-bearing Trees				% Non-Bearing Trees
	Under 10 yrs.	10–14 years	15–19 years	20–24 years	25–29 years	30–34 years	35–39 years	40 yrs. & over	Total		Under 5 yrs.	5–8 years	9 yrs. & over	Total	
All Others (Winter)															
Condition A	—	150	35	53	191	—	—	—	429	.87	19	49	—	68	.83
Condition B	—	52	31	326	173	324	31	66	1,003	2.03	15	—	—	15	.18
Condition C	—	35	88	70	146	256	242	800	1,637	3.31	—	—	—	—	—
Total		237	154	449	510	580	273	866	3,069	6.21	34	49		83	1.01
FALL VARIETIES															
McIntosh															
Condition A	543	2,552	749	2	125	—	—	—	3,971	8.04	2,457	440	8	2,905	35.41
Condition B	275	597	253	144	10	—	—	—	1,279	2.59	288	361	—	649	7.91
Condition C	32	52	59	—	—	60	12	19	234	.47	194	62	—	256	3.12
Total	850	3,201	1,061	146	135	60	12	19	5,484	11.10	2,939	863	8	3,810	46.44
Wealthy															
Condition A	425	152	75	—	—	—	—	—	652	1.32	44	375	—	419	5.10
Condition B	130	252	30	—	—	50	2	—	464	.94	—	475	—	475	5.79
Condition C	—	20	8	4	53	8	—	10	103	.21	—	—	—	—	—
Total	555	424	113	4	53	58	2	10	1,219	2.47	44	850		894	10.89
Gravenstein															
Condition A	—	125	52	30	10	—	—	—	217	.45	34	—	—	34	.41
Condition B	—	1	130	40	—	7	9	66	253	.51	—	—	—	—	—
Condition C	—	—	15	20	9	15	6	16	81	.16	—	—	—	—	—
Total		126	197	90	19	22	15	82	551	1.12	34			34	.41
Snow															
Condition A	—	—	15	15	7	—	—	—	37	.07	—	—	—	—	—
Condition B	—	8	—	—	55	80	56	40	239	.48	2	—	—	2	.02
Condition C	—	—	10	5	51	22	17	26	131	.27	—	—	—	—	—
Total		8	25	20	113	102	73	66	407	.82	2			2	.02

Age and Condition of Bearing and Non-Bearing Trees by Varieties for 1926 (concluded)

Variety	Number of Bearing Trees									% Total Bearing Trees	Number of Non-bearing Trees				% Non-Bearing Trees
	Under 10 yrs.	10–14 years	15–19 years	20–24 years	25–29 years	30–34 years	35–39 years	40 yrs. & over	Total		Under 5 yrs.	5–8 years	9 yrs. & over	Total	
Wolf River															
Condition A	—	—	65	—	5	—	—	—	70	.14	—	—	—	—	—
Condition B	—	25	80	4	—	—	—	—	109	.23	—	—	—	—	—
Condition C	6	—	5	50	14	—	—	1	76	.15	—	—	—	—	—
Total	6	25	150	54	19			1	255	.52					
All Others (Fall)															
Condition A	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Condition B	—	—	—	—	—	12	—	—	12	.02	—	—	—	—	—
Condition C	—	—	12	—	—	—	6	3	21	.05	—	—	—	—	—
Total			12			12	6	3	33	.07					
SUMMER VARIETIES															
All Others (Summer)															
Condition A	—	—	8	—	—	—	—	—	8	.02	—	—	—	—	—
Condition B	—	—	15	9	—	10	4	—	38	.07	—	—	—	—	—
Condition C	—	3	5	4	—	4	14	3	33	.07	—	—	—	—	—
Total		3	28	13		14	18	3	79	.16					

TABLE 25

Principal Varieties Grouped According to Total Number of Trees

Variety	1924			1925			1926			Three year Average		
	Bearing Trees	Non-bearing Trees	Total Trees	Bearing Trees	Non-bearing Trees	Total Trees	Bearing Trees	Non-bearing Trees	Total Trees	Bearing Trees	Non-bearing Trees	Total Trees
Baldwin	23,825	1,899	25,724	23,825	2,074	25,899	24,394	1,739	26,133	24,015	1,904	25,919
McIntosh	4,472	3,358	7,830	4,539	3,545	8,084	5,484	3,810	9,294	4,832	3,571	8,403
Ben Davis	7,247	25	7,272	7,247	25	7,272	6,754	25	6,779	7,083	25	7,108
Stark	3,458	128	3,586	3,458	134	3,592	3,448	103	3,551	3,454	122	3,576
Wealthy	716	1,428	2,144	816	1,322	2,138	1,219	894	2,113	917	1,215	2,132
Northern Spy	1,412	245	1,657	1,432	225	1,657	1,450	425	1,875	1,431	299	1,730
R. I. Greening	1,013	——	1,013	1,013	——	1,013	1,013	150	1,163	1,013	50	1,063
Delicious	214	545	759	214	539	753	234	533	767	221	539	760
Gravenstein	551	15	566	551	15	566	551	34	585	551	21	572
Snow	407	2	409	407	2	409	407	2	409	407	2	409
All Others	4,441	354	4,795	4,441	354	4,795	4,442	494	4,936	4,441	400	4,841
Total	47,756	7,999	55,755	47,943	8,235	56,178	49,396	8,209	57,605	48,365	8,148	56,513

TABLE 26

Varietal Trends During the Three Years (1924-27)

Variety	Bearing Trees		Non-bearing Trees		Total Trees		Percentage of	
	Increase	Decrease	Increase	Decrease	Increase	Decrease	Increase	Decrease
Baldwin	569	——	——	160	409	——	1.59	——
McIntosh	1,012	——	452	——	1,464	——	18.70	——
Ben Davis	——	493	——	——	——	493	——	6.78
Stark	——	10	——	25	——	35	——	.98
Wealthy	503	——	——	534	——	31	——	1.44
Northern Spy	38	——	180	——	218	——	13.16	——
R. I. Greening	——	——	150	——	150	——	14.81	——
Delicious	20	——	——	12	8	——	1.05	——
Gravenstein	——	——	19	——	19	——	3.36	——
Snow	——	——	——	——	——	——	——	——
All Others	1	——	140	——	141	——	2.94	——
Total	2,143	503	941	731	2,409	559		
Net Increase	1,640		210		1,850		3.32	

Fifty-one known varieties of apples were found on the farms included in this study. Many of these varieties had only a comparatively small number of trees and were of no commercial significance. The trend is toward fewer commercial varieties as indicated by recent plantings and grafting operations. New plantings were confined largely to six varieties: McIntosh, Baldwin, Northern Spy, Delicious, R. I. Greening, and Cortland; while grafting was confined mainly to two varieties, McIntosh and Baldwin.

TABLE 27

*Plantings During the Period 1924 to 1927**

Variety	Number of Trees			Total For 3 yrs.	% of Total
	1924	1925	1926		
Baldwin	182	181	152	515	14.06
Cortland	25	——	111	136	3.71
Delicious	275	——	15	290	7.92
McIntosh	1,408	254	480	2,142	58.47
R. I. Greening	——	——	150	150	4.10
Northern Spy	95	——	200	295	8.05
All Others	21	——	114	135	3.69
Total	2,006	435	1,222	3,663	100.00

*New plantings do not include grafted Natural Fruit trees which were not re-set.

In Table 28 is shown the percentage of trees grouped according to seasons. On an average, winter varieties comprised 78.97 per cent of all trees; fall varieties, 20.89 per cent; and summer varieties, only .14 per cent.

TABLE 28

Percentage of All Trees by Seasons

Season	1924			1925		
	Per cent of Total Trees			Per cent of Total Trees		
	Bearing	Non-bearing	Total	Bearing	Non-bearing	Total
Winter	73.97	5.72	79.69	73.45	5.95	79.40
Fall	11.54	8.63	20.17	11.75	8.71	20.46
Summer	.14	——	.14	.14	——	.14
Total	85.65	14.35	100.00	85.34	14.66	100.00

Season	1926			Three-year Average		
	Per cent of Total Trees			Per cent of Total Trees		
	Bearing	Non-bearing	Total	Bearing	Non-bearing	Total
Winter	71.81	6.02	77.83	73.07	5.90	78.97
Fall	13.80	8.23	22.03	12.37	8.52	20.89
Summer	.14	——	.14	.14	——	.14
Total	85.75	14.25	100.00	85.58	14.42	100.00

Winter Varieties

There were thirty-eight known winter varieties of apples grown on the 93 farms. A brief discussion of the more important commercial varieties will be given consideration.

Baldwin

The Baldwin was not only the most important variety of the winter group, but also the leading variety in the area studied. There were 24,394 bearing, and 1,739 non-bearing trees in 1926. These figures represented 49.39 per cent of the bearing, and 21.18 per cent of the non-bearing trees. Twenty-six per cent of the bearing trees were forty years or older. Nearly two-thirds, 63.94 per cent, of the trees in this age group were in "C", or poor condition.

There has been an increase of 569 bearing trees and a decrease of 160 non-bearing trees of this variety during the past three

years. This gives a net increase of 409 trees, or a percentage increase of 1.59 per cent of the total trees in 1924. Even with this small increase in the number of trees, recent plantings are not sufficient to maintain present production considering the normal death rate of the present bearing trees.

With the introduction of popular varieties of eating apples like the McIntosh and Delicious, the demand for Baldwin apples is probably not so great as formerly.

The Baldwin apple crop averaged for the three years, 17,055 barrels, which represented 54.67 per cent of the apples produced.

Ben Davis

Ben Davis ranked second in importance among the winter varieties, both from the standpoint of the number of trees and apples produced. There were 6,754 bearing, and 25 non-bearing trees in 1926. This represented 13.67 per cent of all bearing trees, and .30 per cent of all non-bearing trees. Plantings of this variety have been negligible during the last 15 years, with relatively heavy grafting of the trees to other varieties. There was a decrease of 493 trees in this variety from 1924 to 1926, or a decrease of 6.78 per cent. These data indicate conclusively that Ben Davis is fast declining in importance.

The average production for Ben Davis was 4,053 barrels per year, or 12.99 per cent of the total average apple crop.

Stark

Of the winter varieties, Stark ranked third in importance, both from the standpoint of total number of trees and production of apples. There were 3,448 bearing, and 103 non-bearing trees of this variety. This number of trees comprised 6.98 per cent of the total bearing, and 1.25 per cent of the total non-bearing trees. There was a decrease of 35 trees, or a percentage decrease of .98 per cent during the three year period. From these data it is reasonable to expect this variety to decline in importance, but probably not as extensively or as rapidly as the Ben Davis.

The average production of Stark apples was 2,661 barrels per year, or 8.53 per cent of the total average production of apples.

Northern Spy

The Northern Spy ranked fourth in importance, with 1,450 bearing, and 425 non-bearing trees. These figures represented

2.94 per cent of all bearing trees, and 5.18 per cent of all non-bearing trees. Plantings in this variety during the last 15 years have been much heavier than those of Stark. There was an increase of 218 trees, or an increase of 13.16 per cent for the last three years. In spite of its slowness in coming into bearing, the Northern Spy is one of the most profitable varieties to grow where soil conditions and slope are suitable.

The three-year average production for the Northern Spy crop was 1,128 barrels, or 3.62 per cent of the average total production.

Rhode Island Greening

Of the winter varieties, the Rhode Island Greening ranked next in importance, with 2.05 per cent of the bearing, and 1.83 per cent of the non-bearing trees. Eighty per cent of the bearing trees were 30 years or older. With the exception of one planting of 150 trees, there have been no plantings of this variety for the past ten years. It is reasonable to expect that this one planting will not be sufficient to offset the high death rate of the old bearing trees.

The average production of this variety was 902 barrels, or 2.89 per cent of the total average apple crop.

Delicious

The Delicious is a relatively new variety. There were 234 bearing, and 533 non-bearing trees of this variety, or .47 per cent of the total bearing, and 6.49 per cent of the total non-bearing trees. All trees have been planted during the last twenty years and the majority are in good condition.

Gano

The Gano, which ranked next in importance among the winter varieties from the standpoint of total number of trees, is relatively unimportant. Gano trees comprised .65 per cent of the bearing and .30 per cent of the non-bearing trees. Nearly all the bearing trees were under 25 years of age.

Considering the age of the trees, it is reasonable to expect an appreciable increase in production of this variety if the trees are not grafted over. It may be expected, however, that many of these young trees will be top-worked into more popular varieties.

Harvey Greening

The Harvey Greening is a variety of little commercial importance in Oxford County. There were only 204 bearing, and 100 non-bearing trees of this variety.

Cortland

All of the trees of this variety were under 5 years of age and were in good condition. There was a total of 286 trees.

Tolman Sweet

This is an old variety and one which has little commercial value. There were 254 trees of this variety, all of which were in bearing. No plantings of this variety have been made during the last fifteen years.

Milden

This variety has never been one of the leading varieties in the county but has been of importance on some farms. There was a total of 225 trees, all of which were 30 years or older and only in fair condition. The Milden is not only rapidly declining in importance, but may actually become extinct in Oxford County.

Other Winter Varieties

The most important of the other winter varieties will be listed in the order of their importance from the standpoint of the total

TABLE 29

Percentage of Bearing and Non-Bearing Trees of Winter Varieties for 1926

Variety	Per cent of Bearing Trees	Per cent of Non-bearing Trees	Per cent of Total Trees
Baldwin	49.39	21.18	45.37
Ben Davis	13.67	.30	11.77
Stark	6.98	1.25	6.16
Northern Spy	2.94	5.18	3.25
R. I. Greening	2.05	1.83	2.02
Delicious	.47	6.49	1.33
Gano	.65	.30	.60
Harvey Greening	.41	1.22	.53
Cortland	—	3.48	.50
Tolman Sweet	.51	—	.44
Milden	.46	—	.39
All Others	6.21	1.01	5.47
Total	83.74	42.24	77.83

number of trees for the year 1926. They were: Fallawater, King, Stayman Winesap, Wagener, Arctic, Mann, Rolfe, Bellflower, Roxbury Russet, Golden Russet, Twenty Ounce, Hubbardston, North Star, Rome Beauty, Haas, Canada Red, Blue Pearmain, Golden Delicious, Seek-No-Further, Spitzenburg, Black Oxford, Nonesuch, Newton's Pippin, Nodhead, Sutton, and Jonathan.

Fall Varieties

Nine known fall varieties of apples were found on the farms included in this study. Fall varieties comprised 16.10 per cent of the bearing, and 57.76 per cent of the non-bearing trees in 1926. This indicates that there have been heavy plantings among varieties in the fall group. The more important commercial varieties will be considered in the order of their importance.

McIntosh

McIntosh was found to be the leading fall variety. There were 5,484 bearing, and 3,810 non-bearing trees of this variety. These figures represented 11.10 per cent of the bearing, and 46.44 per cent of the non-bearing trees. This shows that nearly one-half of the non-bearing trees were McIntosh. The heaviest plantings have been made during the last five years. Of the bearing trees, 94.58 per cent were under 20 years of age. Nearly all the trees of this variety were in good or excellent condition.

During the three years of the study there was an increase of 1,012 bearing, and 1,464 non-bearing McIntosh trees, or a net increase of 18.70 per cent. Barring all unforeseen injury to trees, a large increase in production is expected. The McIntosh tree is hardy, comes into bearing early, and is a prolific annual bearer of fruit which is in good demand at relatively high prices.

The average total production of McIntosh was equivalent to 2,122 barrels, or 6.80 per cent of the total average apple crop. The low production per tree was due to a relatively large number of young bearing trees (Table 24).

Wealthy

This variety ranked second in importance among the fall group from the standpoint of total number of trees. There were 1,219 bearing, and 894 non-bearing trees, or 2.47 per cent of the

bearing, and 10.89 per cent of the non-bearing trees. During the three years of this study there was an increase of 503 bearing trees, and a decrease of 534 non-bearing trees. This gives a decrease of 1.44 per cent of the total number of trees. Like the McIntosh a large number of the trees were young and in good condition. Ninety-four per cent of the bearing trees were under 20 years of age.

The average total production of Wealthy was 329 barrels, or 1.05 per cent of the average total production of apples. The low production per tree was due largely to the fact that the trees were young and immature (Table 24).

Gravenstein

This variety was next in importance among the fall varieties with 551 bearing, and 34 non-bearing trees. These figures comprise only 1.12 per cent of the bearing, and .41 per cent of the non-bearing trees. There has been a percentage increase of 3.36 per cent in the total number of trees of this variety during the last three years. This indicates that the variety will at least maintain its present importance for the next few years.

The average production of Gravenstein was 356 barrels, or 1.14 per cent of the average total production of all varieties.

Snow

There were 407 bearing, and 2 non-bearing trees of this variety. Eighty-seven per cent of the bearing trees were 25 years or older. With a high percentage of old trees and practically no trees coming into bearing, a decline in the production of Snow apples is expected.

The average production of Snow apples was 507 barrels.

Wolf River

This variety ranked fifth among the fall varieties from the standpoint of number of trees. There were 255 trees, all of which were of bearing age. Practically all the trees were under 30 years of age.

Other Fall Varieties

Other fall varieties were unimportant, comprising only 33 bearing trees.

TABLE 30

Percentage of Bearing and Non-Bearing Trees of Fall Varieties for 1926

Variety	Per cent of Bearing Trees	Per cent of Non-bearing Trees	Per cent of Total Trees
McIntosh	11.10	46.44	16.13
Wealthy	2.47	10.89	3.67
Gravenstein	1.12	.41	1.02
Snow	.82	.02	.71
Wolf River	.52	—	.44
All Others	.07	—	.06
Total	16.10	57.76	22.03

Summer Varieties

There were four known summer varieties found on the 93 farms. None of these varieties were of commercial significance. The leading varieties in the order of their importance were: Duchess, Astrachan, Transparent, and Williams.

Size of Bearing Orchards

Large variations in the size of commercial orchards were found on the 93 farms included in the study. Sixteen growers had, on an average for the three years, bearing orchards with less than 200 trees; 28 had orchards ranging from 200 to 399 trees; 20 had orchards ranging from 400 to 599 trees; 21 had orchards ranging from 600 to 999 trees; and 8 had orchards having over 1,000 trees. The average number of bearing trees per farm was 520.

Forty-one per cent of the bearing trees were in orchards of less than 600 trees, and 75 per cent were in orchards of less than 1,000 trees. These data are given in Table 31.

There was an increase of 1,850 trees during the three years of this study. This is a percentage increase of 3.32 per cent. Bearing orchards ranging from 800 to 999 trees in 1924 increased 8.03 per cent during this period, or an average increase of 2.68 per cent per year. Orchards with less than 200 trees showed the next highest increase, with an average of 2.04 per cent per year. There

was no increase in the size of orchards on farms having 1,500 or more trees.

TABLE 31

Relation Between Total Number of Bearing and Non-Bearing Trees by Size of Bearing Orchards—Average for Three Years

Bearing Orchards No. of Trees	Average No. of Farms	Total Bearing Trees	% Total Bearing Trees	Total Non-bearing Trees	% Total Non-bearing Trees
0 — 199	16	2,302	4.76	826	10.14
200 — 399	28	8,033	16.61	1,589	19.50
400 — 599	20	9,615	19.88	1,109	13.61
600 — 799	11	7,680	15.88	624	7.66
800 — 999	10	8,731	18.05	1,783	21.88
1000 — 1499	3	3,763	7.78	717	8.80
1500 — 1999	4	6,002	12.41	300	3.68
2000 & over	1	2,239	4.63	1,200	14.73
Total	93	48,365	100.00	8,148	100.00

TABLE 32

Increase in Orchards of Various Sizes from 1924 to 1927

Bearing Orchards No. of Trees	1924			1927			Increase	Percentage Increase
	Bearing Trees	Non-bearing Trees	Total Trees	Bearing Trees	Non-bearing Trees	Total Trees		
0 — 199	2,407	961	3,368	2,568	1,006	3,574	206	6.12
200 — 399	8,175	1,671	9,846	8,627	1,305	9,932	86	.87
400 — 599	9,549	853	10,402	9,609	1,200	10,809	407	3.91
600 — 799	7,466	597	8,063	7,528	701	8,229	166	2.06
800 — 999	9,036	1,617	10,653	9,411	2,097	11,508	855	8.03
1000 — 1499	3,383	800	4,183	3,913	400	4,313	130	3.11
1500 — 1999	5,501	300	5,801	5,501	300	5,801	——	——
2000 & over	2,239	1,200	3,439	2,239	1,200	3,439	——	——
Total	47,756	7,999	55,755	49,396	8,209	57,605	1,850	Av. 3.32

MANAGEMENT OF BEARING ORCHARDS

A discussion of the more important orchard practices is relevant to a clear understanding of the conditions under which apples are produced in the area covered by this study. The orchard practices which are given consideration are as follows: pruning, cultivating, fertilizing, thinning, spraying and dusting.

Pruning

The average time spent in pruning and in the disposal of brush was 20.79 hours of human labor, and 4.01 hours of horse labor per one hundred bearing trees for 1924-25; 27 hours of human labor, and 1.55 hours of horse labor in 1925-26; 18.60 hours of human labor, and 1.95 hours of horse labor in 1926-27. The average for the three years was 22.1 hours of human labor and 2.5 hours of horse labor per one hundred trees. There were eight growers who did no pruning in 1924-25, eight in 1925-26, and nine in 1926-27. Three growers did no pruning during the three years of the study. Orchardists following an irregular pruning practice were among the smaller growers.

TABLE 33

Hours of Human Labor Pruning and Disposing of Brush By Size of Bearing Orchards

Size of Orchards Bearing Trees	Av. No. Bearing Trees	Number of Hours Spent in			Average for 3 years	Av. Hrs. per 100 Trees
		1924–25	1925–26	1926–27		
0 — 199	2,302	816	673	621	703	30.5
200 — 399	8,033	1,821	2,672	2,276	2,256	28.1
400 — 599	9,615	2,647	3,206	1,700	2,519	26.2
600 — 799	7,680	1,150	1,436	1,185	1,257	16.4
800 — 999	8,731	1,964	3,250	1,914	2,376	27.2
1000 — 1499	3,763	648	844	672	721	19.2
1500 — 1999	6,002	477	756	603	612	10.2
2000 & over	2,239	405	180	216	267	11.9
Total	48,365	9,928	13,017	9,187	10,711	Av. 22.1

In small orchards, 30 hours of human labor was expended in pruning 100 trees as compared with 10.7 hours in orchards having 1,500 trees or more. This difference is due mainly to better efficiency of labor in large orchards where a higher percentage of trees are in block formation, and to the fact that the trees in orchards of large size are usually pruned annually and less time is required for pruning.

Cultivating

The most common practice among growers was to cultivate the trees not yet in bearing where they were set in block formation, and to follow sod culture for blocks of bearing trees. Where sod culture was followed, the usual practice was to cut the grasses in

the orchard at haying time, placing part of the cured hay around the trees to form a mulch, and hauling the remainder to the barns. Young trees which were planted along the roadside, along the stone walls, and to replace dead trees in bearing orchards were usually in sod.

Fifteen growers cultivated all or part of their bearing orchards in 1924, twelve in 1925 and 1926. Only five growers cultivated the trees in their bearing orchards during each of the three years. Orchards which were cultivated averaged much larger in size than those which were in sod.

TABLE 34

Cultivation of Bearing Orchards

	1924		1925		1926	
	Sod	Cultivated	Sod	Cultivated	Sod	Cultivated
No. of Farms	78.	15.	81.	12.	81.	12.
Per cent of Farms	83.87	16.13	87.10	12.90	87.10	12.90
Per cent of Trees	72.99	27.01	81.82	18.18	81.44	18.56
Trees per Farm	446.90	859.87	484.27	726.42	496.67	763.83

Three growers used tractors for power in cultivating their bearing orchards in 1924, and 4 in 1925 and 1926. The tractors were used for this purpose a total of 68 hours in 1924, 390 hours in 1925, and 166 hours in 1926.

Fertilizing

Barnyard manure was used on 55 farms, or by 59.1 per cent of the growers in 1924; on 39 farms, or by 41.9 per cent of the growers in 1925; and on 32 farms, or by 34.4 per cent of the growers in 1926. A total of 1,392 tons of manure was applied in 1924, 1,477 tons in 1925, and 623 tons in 1926. There were, on an average, 20 growers who applied manure as the only form of fertilizer to their orchards, and 22 growers who used manure with some form of commercial fertilizer.

Nitrate of soda was the most popular commercial fetrilizer used by apple growers. A total of 34.9 tons was applied in 1924 by 57 growers, 36 tons in 1925 by 48 growers, and 32.3 tons in 1926 by 49 growers. Nitrate of soda was the only fertilizer used by 27.6 per cent of the growers while 28.7 per cent used nitrate

with some other form of fertilizer during the three years of the study. There were two growers who used sulphate of ammonia in 1926.

A total of 8.6 tons of acid phosphate was applied in 1924, 3.2 tons in 1925, and 1.3 tons in 1926. This fertilizer was used in combination with other fertilizers.

The most popular combination of fertilizers used was that of manure and nitrate of soda. An average of 17 growers used these two fertilizers during the three years.

There was a direct relationship between the size of bearing orchards and the use of fertilizer. On an average for the three years, only two-thirds of the bearing orchards having less than 400 trees were fertilized, while 87.8 per cent of the orchards with more than 400 trees received an application of fertilizer.

TABLE 35

Average Percentage of Growers Using Various Fertilizers and Combinations of Fertilizers for Three Years —According to Size of Bearing Orchard

Size of Orchards Bearing Trees	No Fertilizer	Manure	Nitrate of Soda	Manure and Nitrate of Soda	Nitrate of Soda & Acid Phos.	Manure, Nitrate of Soda & Acid Phos.	Other Combinations
0 — 199	34.70	24.49	34.69	6.12	—	—	—
200 — 399	33.74	28.92	18.07	9.64	1.20	6.02	2.41
400 — 599	13.11	21.31	27.88	22.95	4.91	6.56	3.28
600 — 799	20.59	17.65	20.59	29.41	8.82	—	2.94
800 — 999	—	10.34	48.28	24.14	3.45	13.79	—
1000 — 1499	—	—	40.00	50.00	10.00	—	—
1500 — 1999	30.00	10.00	30.00	20.00	10.00	—	—
2000 & over	—	—	—	100.00	—	—	—
Average	22.58	21.15	27.60	18.64	3.58	4.66	1.79

Thinning

Thinning was found to be an unimportant orchard practice. Only three growers reported thinning in 1924 and 1925, and four in 1926. Growers thinned only a few varieties in their orchards. Of the five varieties thinned, the more important ones were Wealthy and McIntosh. Apples on 418 trees were thinned in 1924, apples on 188 trees in 1925, and apples on 340 trees in 1926. There was no uniform method of thinning. Some growers left one

apple on a spur and others thinned the fruit to about six inches apart.

TABLE 36

Number of Trees of Each Variety Where Thinning Was Practiced

Variety	1924		1925		1926	
	No. Farms*	No. Trees	No. Farms	No. Trees	No. Farms*	No. Trees
Wealthy	2	268	2	168	1	100
McIntosh	1	50	—	—	2	100
Gravenstein	—	—	—	—	1	40
Snow	—	—	1	20	—	—
Wagener	1	100	—	—	1	100
Total	4	418	3	188	5	340

*One grower thinned two varieties in 1924 and 1926.

We may expect that this orchard practice will become more popular in the future as the large number of trees of fall varieties come into bearing. It is necessary in many cases to thin Delicious apples in order that the fruit may grow to a good size. The fruit, on McIntosh trees which are twenty years old or over and where the trees are of good size, will often run small for the variety unless thinned.

Spraying and Dusting

Spraying or dusting, or a combination of both, is one of the most important practices in orchard management. Where a thorough spraying or dusting program was carefully followed the quality of the apples was greatly improved and indirectly the quantity of fruit was increased to some extent.

This orchard practice was either neglected entirely or improperly done by approximately one-third of the growers. There were 19 growers, or 20.43 per cent of the farmers in 1924; 17 growers, or 18.28 per cent in 1925; and 27 growers, or 29.03 per cent in 1926, who did no spraying or dusting. Nearly 12 per cent of the growers did not spray or dust their orchards during the three years. Twenty-eight different spray programs were used in 1924, 39 in 1925, and 29 in 1926. Seventeen growers applied only the calyx spray or dust in 1924, ten in 1925, and fourteen in 1926. Nine growers applied the dormant and calyx sprays or dusts, or a combination of the two in 1924, seven in 1925, and

three in 1926. There were only a few growers each year using any one of the other spraying or dusting programs.

In Table 37 is shown the number of growers doing spraying and dusting during each of the three years of the study.

TABLE 37

Number of Growers Doing Spraying and Dusting

Year	Growers Doing		
	Spraying	Dusting	Combinations of Spraying & Dusting
1924	56	13	5
1925	62	11	3
1926	50	15	1
Average	56	13	3

The average relative importance of the various sprays applied during the three years ranked as follows: calyx, pink, dormant, pre-pink, first summer, delayed dormant, second summer, and third summer. Dust applications for these years ranked as fol-

TABLE 38

Relative Importance of Sprays and Dusts Applied

Sprays & Dusts	1924			1925			1926		
		Per cent of			Per cent of			Per cent of	
	Farms	Farms	Trees	Farms	Farms	Trees	Farms	Farms	Trees
Sprays									
Dormant	32	34.41	32.90	23	24.73	19.24	8	8.60	6.60
Delayed Dormant	1	1.08	1.37	9	9.68	12.07	8	8.60	10.45
Pre-Pink	23	24.73	27.95	18	19.35	23.02	16	17.20	17.82
Pink	24	25.81	26.44	25	26.88	26.82	22	23.66	25.57
Calyx	58	62.36	58.81	54	58.06	52.02	46	49.46	44.82
Summer[1]	9	9.68	10.18	19	20.43	19.95	7	7.58	9.27
Summer[2]	5	5.38	7.37	1	1.08	.98	1	1.08	2.02
Summer[3]	2	2.15	3.77	—	—	—	—	—	—
Summer[4]	—	—	—	—	—	—	—	—	—
Additional Sprays	15	16.13	4.05	14	15.05	5.29	16	17.20	7.59
Dusts									
Dormant	—	—	—	3	3.22	8.43	3	3.22	3.85
Delayed Dormant	—	—	—	1	1.08	1.51	2	2.15	5.61
Pre-Pink	7	7.53	12.86	9	9.68	18.69	7	7.53	15.84
Pink	8	8.60	13.24	11	11.83	21.33	10	10.75	19.07
Calyx	11	11.83	15.53	12	12.90	22.14	12	12.90	22.26
Summer[1]	6	6.45	14.45	6	6.45	13.64	6	6.45	12.37
Summer[2]	3	3.22	10.91	4	4.30	10.28	3	3.22	7.30
Summer[3]	—	—	—	—	—	—	1	1.08	4.53
Summer[4]	—	—	—	—	—	—	—	—	—
Additional Dusts	9	9.68	2.77	7	7.53	5.64	8	8.60	4.44

lows: calyx, pink, pre-pink, first summer, second summer, dormant, and delayed dormant.

Data on the relative popularity of sprays and dusts are shown in Table 38.

Growers whose bearing orchards were small in size did considerably less spraying and dusting than those with larger orchards. The main reason for the lack of a thorough spraying or dusting program among small growers was due to the uneconomical size of their orchards. There were, however, several growers with large orchards who did no spraying or dusting. In Table 39 is shown the percentage of growers practicing various spraying and dusting programs grouped according to the size of bearing orchards.

TABLE 39

Average Percentage of Growers Applying Various Sprays and Dusts for Three Years According to Size of Bearing Orchards

Size of Orchards Bearing Trees	None	Calyx Alone	Dormant & Calyx	Other Combinations*					
				A	B	C	D	E	F
0 — 199	34.69	24.49	6.12	—	14.29	14.29	4.08	—	2.04
200 — 399	28.93	16.87	6.02	1.20	15.66	15.66	4.82	3.61	7.23
400 — 599	8.20	11.48	14.75	1.64	27.87	29.50	1.64	1.64	3.28
600 — 799	26.47	8.82	2.94	—	14.71	35.30	2.94	5.88	2.94
800 — 999	13.79	13.79	3.45	3.45	—	58.62	3.45	—	3.45
1000 — 1499	—	—	—	—	—	80.00	20.00	—	—
1500 — 1999	30.00	10.00	—	—	20.00	30.00	—	—	10.00
2000 & over	—	—	—	—	—	66.67	—	—	33.33
Average	22.22	14.70	6.81	1.08	15.77	28.67	3.94	2.15	4.66

*Other Combinations

A = One or more sprays or dusts or combinations, exclusive of calyx and summers.

B = One or more of the following sprays or dusts or combinations: dormant, delayed dormant, pre-pink, pink, with calyx and exclusive of summers.

C = One or more of the following sprays or dusts or combinations: dormant, delayed dormant, pre-pink, pink, with calyx and summers.

D = Calyx, and one or more summer sprays or dusts or combinations.

E = One or more of the following sprays or dusts or combinations: dormant, delayed dormant, pre-pink, pink, with summer sprays or dusts or combinations, but exclusive of calyx.

F = All combinations of summer and additional sprays or dusts or combinations.

COSTS AND RETURNS IN PRODUCING AND MARKETING APPLES

The charges in producing and marketing apples were classified as follows: human labor, horse labor, use of auto trucks, use of tractors, use of equipment, use of buildings, barrels and baskets, spraying and dusting materials, fertilizers and manure, interest, taxes, trees for replacement and new plantings, and miscellaneous charges. The returns were for apples sold, home consumption of apples, appreciation on orchards (including value of new plantings), and miscellaneous returns.

Due to the large number of varieties of apples grown under widely varying conditions, it was necessary to limit the discussion of the cost and return analysis to all varieties taken collectively.

Costs

Human Labor

The average rate per hour of human labor was 34.7 cents in 1924-25, 37.2 cents in 1925-26, and 37.0 cents in 1926-27. This gives a three-year average rate of 36.3 cents per hour. These rates were the composites of the wages paid to hired men, including board and lodging where furnished, value of unpaid labor, and the value of the operator's labor.

All labor was recorded by operations and grouped into two main classes: labor in the management of orchards, and labor for harvesting and marketing apples.

The average charge for human labor in the management of orchards was $66.94 per farm, or $11.17 per 100 trees in 1924-25; $77.84, or $12.89 per 100 trees in 1925-26; and $62.33, or $10.06 per 100 trees in 1926-27. Over four-fifths of the management charge for human labor each year was for pruning, and spraying and dusting operations (Table 40).

The average charge for human labor for harvesting and marketing the apples per farm was $199.68, or 53 cents per barrel of apples in 1924-25; $190.97, or 55 cents per barrel in 1925-26; and $134.79, or 52 cents per barrel in 1926-27.

The average charge per barrel for the three years was 33.7 cents for picking, 14.7 cents for grading and packing, and 5 cents for hauling. Since all apples were not graded and packed into containers for shipment, and all apples were not hauled to the shipping station, the average rates for these operations were low.

TABLE 40

Charges for Human Labor in the Management of Orchards

Operation	1924-25					1925-26				
	Hours	Cost	Operation Hired	Total Cost	% Total Cost	Hours	Cost	Operation Hired	Total Cost	% Total Cost
Pruning & Hauling Brush	9,928	$3,445.01	$ ——	$3,445.01	55.34	13,017	$4,842.32	——	$4,842.32	66.89
Cultivating	871	302.24	——	302.24	4.85	629	233.99	——	233.99	3.23
Fertilizing	576	199.87	——	199.87	3.21	673	250.36	——	250.36	3.46
Manuring	1,626	564.22	1.00	565.22	9.08	1,455	541.26	——	541.26	7.48
Spraying & Dusting	4,788	1,661.44	30.00	1,691.44	27.17	3,632	1,351.10	——	1,351.10	18.66
Thinning	63	21.86	——	21.86	.35	55	20.46	——	20.46	.28
Total	17,852	$6,194.64	$31.00	$6,225.64	100.00	19,461	$7,239.49		$7,239.49	100.00

Operation	1926-27					Three-year Average				
	Hours	Cost	Operation Hired	Total Cost	% Total Cost	Hours	Cost	Operation Hired	Total Cost	% Total Cost
Pruning & Hauling Brush	9,318	$3,447.66	$70.00	$3,517.66	60.68	10,755	$3,911.66	$23.34	$3,935.00	60.96
Cultivating	638	236.06	86.50	322.56	5.56	713	257.43	28.83	286.26	4.55
Fertilizing	546	202.02	——	202.02	3.49	598	217.42	——	217.42	3.39
Manuring	601	222.37	——	222.37	3.84	1,227	442.62	.33	442.95	6.80
Spraying & Dusting	3,970	1,468.90	30.00	1,498.90	25.86	4,130	1,493.81	20.00	1,513.81	23.90
Thinning	89	32.93	——	32.93	.57	69	25.08	——	25.08	.40
Total	15,162	$5,609.94	$186.50	$5,796.44	100.00	17,492	$6,348.02	$72.50	$6,420.52	100.00

TABLE 41

Charges for Human Labor Harvesting and Marketing Apples

Operation	1924-25					1925-26				
	Hours	Cost	Operation Hired	Total Cost	% Total Cost	Hours	Cost	Operation Hired	Total Cost	% Total Cost
Picking	30,904	$10,723.68	$1,535	$12,258.68	66.01	28,997	$10,786.88	$337	$11,123.88	62.63
Grading & Packing	10,547	3,659.81	698	4,357.81	23.47	12,958	4,820.38	501	5,321.38	29.96
Hauling	4,585	1,591.00	363	1,954.00	10.52	3,076	1,144.27	171	1,315.27	7.41
Total	46,036	$15,974.49	$2,596	$18,570.49	100.00	45,031	$16,751.53	$1,009	$17,760.53	100.00

Operation	1926-27					Three-year Average				
	Hours	Cost	Operation Hired	Total Cost	% Total Cost	Hours	Cost	Operation Hired	Total Cost	% Total Cost
Picking	19,858	$7,347.46	$895	$8,242.46	65.75	26,587	$9,619.35	$922.33	$10,541.68	64.80
Grading & Packing	6,691	2,475.67	679	3,154.67	25.17	10,065	3,651.95	626.00	4,277.95	26.20
Hauling	2,471	914.27	224	1,138.27	9.08	3,377	1,216.51	252.67	1,469.18	9.00
Total	29,020	$10,737.40	$1,798	$12,535.40	100.00	40,029	$14,487.81	$1,801.00	$16,288.81	100.00

Horse Labor

The average rate per hour of horse labor was 18.2 cents in 1924-25, 16.2 cents in 1925-26, and 19.9 cents in 1926-27. The relatively higher rate for the last year was probably due to the influence of a large amount of road construction work in two of the five towns where the study was conducted.

The average charge for horse labor in the management of orchards was $22.89 per farm, or $3.82 per 100 trees in 1924-25; $14.15, or $2.34 per 100 trees in 1925-26; and $16.62, or $2.68 per 100 trees in 1926-27. Over 60 per cent of the management charges each year were for manuring, and spraying and dusting operations.

The average charge for horse labor for hauling apples per farm was $16.09 for the first year, $8.22 for the second, and $8.06 for the last year of the study. These charges do not include those for the use of auto trucks for hauling apples which amounted to 52.05 per cent, 65.47 per cent, and 61.10 per cent of the total hauling charges respectively for each of the three years. The average cost of hauling apples per barrel was 8.6 cents in 1924-25, 6.8 cents in 1925-26, and 7.8 cents in 1926-27, which gives an average of 7.7 cents for the three years. These charges appear low due to the fact that approximately 20 per cent of the apples each year were not hauled from the farm. Information on the charges for horse labor and use of auto trucks for hauling apples is given in Table 43.

Use of Auto Trucks

The average charge for the use of auto trucks for the three years was $1.103 per hour. The three-year average was used to give the rate greater significance; as only 24 growers used auto trucks in 1924, 28 in 1925, and 30 in 1926. Ninety-two per cent of the trucks used were Fords.

The charge for the use of auto trucks for hauling apples per farm was $17.46 in 1924, $15.59 in 1925, and $12.66 in 1926.

Auto trucks were used 52 hours in 1924 for hauling commercial fertilizer to orchards. This represented a charge of $57.36.

TABLE 42

Charges for Horse Labor in the Management of Orchards

Operation	1924-25					1925-26				
	Hours	Cost	Operation Hired	Total Cost	% Total Cost	Hours	Cost	Operation Hired	Total Cost	% Total Cost
Hauling Brush	1,915	$348.53	$—	$348.53	16.37	744	$120.53	$—	$120.53	9.16
Cultivating	1,606	292.29	—	292.29	13.73	446	72.25	—	72.25	5.49
Fertilizing	745	135.59	—	135.59	6.37	692	112.10	—	112.10	8.52
Manuring	2,881	524.34	2.00	526.34	24.72	2,848	461.38	—	461.38	35.04
Spraying & Dusting	4,413	803.17	23.00	826.17	38.81	3,396	550.15	—	550.15	41.79
Total	11,560	$2,103.92	$25.00	$2,128.92	100.00	8,126	$1,316.41	$	$1,316.41	100.00

Operation	1926-27					Three-year Average				
	Hours	Cost	Operation Hired	Total Cost	% Total Cost	Hours	Cost	Operation Hired	Total Cost	% Total Cost
Hauling Brush	965	$192.04	$—	$192.04	12.42	1,208	$220.37	$—	$220.37	12.65
Cultivating	944	187.86	86.50	274.36	17.75	999	184.13	28.33	212.96	12.32
Fertilizing	603	120.00	—	120.00	7.76	680	122.56	—	122.56	7.55
Manuring	1,076	214.12	—	214.12	13.85	2,268	399.95	.67	400.62	24.54
Spraying & Dusting	3,642	724.56	21.00	745.56	48.22	3,817	692.62	14.67	707.29	42.94
Total	7,230	$1,438.58	$107.50	$1,546.08	100.00	8,972	$1,619.63	$44.17	$1,663.80	100.00

TABLE 43

Charges for Horse Labor and Use of Auto Trucks for Hauling Apples

Year	Horse Labor		Truck Labor		Hired Hauled		Total Cost of Hauling	Av. Cost per bbl.
	Hours	Cost	Hours	Cost	Horse	Truck		
1924–25	6,891	$1,254.16	923	$1,018.07	$242.00	$606.00	$3,120.23	$.086
1925–26	4,016	650.59	1,057	1,165.87	114.00	284.00	2,214.46	.068
1926–27	3,011	599.19	728	802.98	150.00	374.00	1,926.17	.078
3-Year Average	4,639	834.65	903	995.64	168.67	421.33	2,420.29	.077

Use of Tractors

Tractors were used for plowing and cultivating orchards a total of 68 hours in 1924, 390 hours in 1925, and 166 hours in 1926. In 1926 tractors were used 56 hours for dusting. Ninety-one per cent of the tractors used were Fordsons. The average rate per hour for the three years was $1.60. This gave a total charge of $108.80 the first year, $624.00 for the second, and $355.20 the last year.

TABLE 44

Charges for Use of Tractors

Year	No. of Farmers Using Tractors	Hours Used	Cost per Hour	Total Cost
1924	3	68.00	$1.60	$108.80
1925	4	390.00	1.60	624.00
1926	4	222.00	1.60	355.20

Use of Equipment

The charge for the use of general farm equipment was computed at the estimated rate of five cents per hour[6] for each of the three years. This gave a total charge of $701.90, or 1.9 cents per barrel of apples in 1924-25; $437.30, or 1.3 cents per barrel in 1925-26; and $329.95, or 1.3 cents per barrel in 1926-27.

The average value of orchard equipment used per farm was

[6]In computing general farm equipment hours, the total number of horse hours was used with the exception of those for spraying and dusting where special orchard equipment was employed.

$86.89 in 1924-25, $108.36 in 1925-26, and $101.66 in 1926-27. Interest, depreciation, repairs, and miscellaneous charges on orchard equipment per farm amounted to $13.38, $18.02, and $13.48, respectively for the three years. This was a charge of 3.5 cents per barrel in 1924-25, and 5.1 cents per barrel for 1925-26 and 1926-27.

TABLE 45

Charges for Orchard Equipment

	Valuation of Orchard Equipment		
	1924–25	1925–26	1926–27
Sprayers	$3,754	$4,804	$4,360
Dusters	2,003	3,050	2,821
Ladders	1,209	1,180	1,200
Headers	188	181	178
Grader	75	70	65
Pruning Equipment	432	430	430
Stencils	420	363	400
Total	$8,081	$10,078	$9,454
Average per Farm	$ 86.89	$ 108.36	$ 101.66
Interest at 5%	$ 404.05	$ 503.90	$ 472.70
Depreciation	699.94	1,027.17	651.81
Repairs	132.38	133.67	118.68
Miscellaneous	8.26	10.82	10.41
Total	$1,244.63	$ 1,675.56	$1,253.60
Average per Farm	$ 13.38	$ 18.02	$ 13.48

Use of Buildings

The growers usually graded and packed their apples in the general farm buildings. Several of the larger growers used their machine and storage sheds as well as the main barn as a place for grading and packing operations. Apples which were stored at the farms during freezing weather were placed in the house cellars.

An estimate was secured from each grower as to the value of the buildings used for all orchard operations. The average total valuation of buildings was $3,551 for 1924-25, $3,693 for 1925-26, and $3,793 for 1926-27 (Table 46). The average charge for the use of buildings was one cent per barrel of apples the first year, 1.1 cents per barrel the second year, and 1.5 cents per barrel the last year.

TABLE 46

Charges for Use of Buildings

	1924–25	1925–26	1926–27
Value Buildings Used for Orchard Operations	$3,551.00	$3,693.00	$3,793.00
Interest at 5 per cent	$ 177.55	$ 184.65	$ 189.65
Repairs & Depreciation	110.18	83.74	88.81
Taxes	68.49	72.17	74.00
Insurance	7.34	7.99	8.40
Total	$ 363.56	$ 348.55	$ 360.86

Barrels and Baskets

The barrel is the standard container for apples in Oxford County, and also for the state of Maine. Only a few growers, especially those with well cared for McIntosh orchards, used baskets. Growers would find it profitable to pack more of their better grades of popular varieties in baskets. The western apple box and the carton were unimportant. Only one grower reported using the carton as an apple container.

The average cost of barrels at the farm was 67 cents, and baskets 23 cents for the season of 1924; 67 cents for barrels and 25 cents for baskets in 1925; and 65 cents for barrels and 23 cents for baskets in 1926.

TABLE 47

Charges for Apple Containers

Year	Amount	Average Price	Value	Per Farm	
				Amount	Value
Barrels					
1924	23,985	$.671	$16,094	257.9	$173.05
1925	22,243	.666	14,814	239.2	159.29
1926	14,157	.651	9,216	152.2	99.10
Baskets*					
1924	1,468	$.233	$ 342	15.8	$ 3.68
1925	1,551	.254	394	16.7	4.24
1926	1,414	.227	321	15.2	3.45

*Sixty boxes were used in 1924, and 100 in 1925. Two hundred forty bushel crates were used in 1925, and 150 in 1926.

Spraying and Dusting Materials

The charge for spraying and dusting materials applied to orchards averaged $6.22 per 100 trees, or 9.6 cents per barrel of apples in 1924; $4.88 per 100 trees, or 8.4 cents per barrel in 1925; and $5.18 per 100 trees, or 12.1 cents per barrel in 1926. There has been only a slight variation in the total expenditure for dusting materials during the three years. The total expenditure for spraying materials, however, decreased nearly 50 per cent in 1925 as compared to 1924; while the total cost of these materials in 1926 was practically the same as in 1925.

Growers followed very closely the spraying and dusting schedule published by the Maine Extension Service[7] for the individual sprays and dusts. Many of the orchardists did not, however, follow a complete spraying or dusting program carefully and thoroughly (Page 104).

The features of a spraying or dusting program which largely determine its value in the production of high grade fruit are:

1. Efficiency of equipment.
2. Time of application.
3. Sufficient applications for control.
4. Thoroughness of application.
5. Materials used and their effectiveness.

Fertilizer and Manure

The average value (for three years) of manure per ton at the barn was $2.84. Manure was charged to the orchards at this rate. No account has been taken of the residual effects of manure applied prior to 1924, or during the period of the study. Usually growers apply about the same amount of manure to their orchards annually. There was an exception to this practice in 1926 partly because of poor weather conditions at the usual hauling time (November and December).

A total of $2,540.43 was expended for commercial fertilizers and a charge of $3,953.28 for manure in 1924; $2,434.75 for commercial fertilizers and $4,194.68 for manure in 1925; and $2,227.00 for commercial fertilizers and $1,769.32 for manure in

[7]University of Maine Extension Service Bulletin, "Fruit Spraying and Dusting in Maine" by A. K. Gardner. Schedule for Apples. Page 7.

TABLE 48

Charges for Spraying and Dusting Materials

Materials	Unit	1924			1925			1926		
		Amount	Price	Value	Amount	Price	Value	Amount	Price	Value
Sprays										
Dry Lime Sulphur	lb.	5,545	$.12	$ 658.22	1,827	$.12	$ 224.70	2,701	$.11	$ 298.78
Liquid Lime Sulphur	gal.	1,189	.26	304.16	1,221	.25	301.72	715	.28	196.68
Arsenate of Lead	lb.	2,846	.22	620.15	1,887	.22	411.12	2,600	.17	443.09
Miscellaneous				126.61			51.14			47.75
Dusts										
85 – 15	lb.	13,144	.08	1,038.42	13,368	.07	949.15	12,094	.08	992.89
90 – 10	lb.	4,301	.07	283.44	2,800	.07	188.98	3,722	.08	279.88
Sulphur Dust	lb.	2,713	.05	133.19	8,952	.05	417.17	13,479	.04	590.39
Copper Dust	lb.	973	.09	89.61	—	—	—	—	—	—
Miscellaneous				216.20			199.02			134.54
Total Charges for Materials				$3,470.00			$2,743.00			$2,984.00
Average Charges per Farm				$ 37.31			$ 29.49			$ 32.09

1926. These charges gave an average cost of $11.65 per 100 trees, or 18 cents per barrel in 1924; $11.80 per 100 trees, or 20.2 cents per barrel in 1925; and $6.94 per 100 trees, or 16.2 cents per barrel in 1926.

TABLE 49

Charges for Commercial Fertilizers and Manure

Kind	Unit	1924		1925		1926	
		Amount	Value	Amount	Value	Amount	Value
Nitrate of Soda	Ton	34.90	$2,251.89	36.02	$2,275.75	30.98	$2,018.00
Sulphite of Ammonia	Ton	—	—	—	—	1.30	82.00
Acid Phosphate	Ton	8.55	208.00	3.15	78.00	4.28	127.00
Wood Ashes	Bushel	575.00	62.00	—	—	—	—
Miscellaneous	Ton	.48	18.54	1.65	81.00	—	—
Manure	Ton	1,392.00	3,953.28	1,477.00	4,194.68	623.00	1,769.32
Total			$6,493.71		$6,629.43		$3,996.32
Average per Farm			$ 69.82		$ 71.28		$ 42.97

Interest

The charge for interest at 5 per cent on the average valuation of orchards amounted to $7,425 in 1924-25, $7,606 in 1925-26, and $7,724 in 1926-27. This gave an average charge of $13.32 per 100 trees, or 20.6 cents per barrel of apples in 1924-25; $13.54 per 100 trees, or 23.2 cents per barrel in 1925-26; and $13.41 per 100 trees, or 31.2 cents per barrel in 1926-27.

In Table 50 is shown the value of orchards and the amounts of the interest charge each year.

TABLE 50

Interest on Valuation of Orchards

Year	Value at		Average Value	Interest at 5 per cent
	Beginning of Year	End of Year		
1924–25	$146,400	$150,600	$148,500	$7,425.00
1925–26	150,600	153,650	152,125	7,606.25
1926–27	153,650	155,325	154,488	7,724.40

Taxes

The average charge for taxes on orchard land was as follows: $30.76 per farm, or $5.13 per 100 trees in 1924; $31.96 per farm,

or $5.29 per 100 trees in 1925; and $32.40 per farm, or $5.23 per 100 trees in 1926.

Trees for Replacement and New Plantings

The cost of young trees per farm was $8.34, or 38.7 cents per tree in 1924; $2.03 per farm, or 43.5 cents per tree in 1925; and $4.55 per farm, or 34.6 cents per tree in 1926.

The total charge for setting these trees was as follows: $13.44 per farm, or 62.3 cents per tree in 1924; $3.27 per farm, or 69.9 cents per tree in 1925; and $6.71 per farm, or 51 cents per tree in 1926.

Miscellaneous Charges

In Table 51 are shown the remaining expenses of producing and marketing apples during 1924-25-26. Some of the more important of these expenditures were for telephone, hail insurance, and hired orchard machinery. Charges for rail and ocean transportation, commission and dray costs are included under all other expenses. Many growers were unable to give these costs separately. Miscellaneous charges amounted to $2.15 per 100 trees, or 3.3 cents per barrel of apples in 1924-25; $1.55 per 100 trees, or 2.7 cents per barrel in 1925-26; and $1.68 per 100 trees, or 3.9 cents per barrel in 1926-27.

TABLE 51

Miscellaneous Expenses on Orchards

Item	1924–25	1925–26	1926–27
Telephone	$ 248.96	$304.29	$334.93
Hail Insurance	128.00	80.00	148.00
Hired Machinery	29.00	16.00	10.00
All Other Expenses	792.72	468.63	474.33
Total	$1,198.68	$868.92	$967.26

RETURNS

Apples Sold

The average gross return from apples sold per farm was $960.06 in 1924-25, $704.38 in 1925-26, and $512.60 in 1926-27. The average gross price received for all grades of apples sold was

$2.65 per barrel the first year, $2.15 the second year, and $2.09 the last year.

Home Consumption of Apples

The average value of apples used on the farm, including salable fruit and culls and ciders, amounted to $25.46 per farm in 1924-25, $19.61 in 1925-26, and $22.86 in 1926-27.

Appreciation of Orchards

Orchards appreciated (including value of new plantings) $4,200 during 1924-25, $3,050 during 1925-26, and $1,675 during 1926-27. This was an average increase per farm of $45.16, $32.80, and $18.01, respectively.

Miscellaneous Returns

The miscellaneous returns were as follows: receipts from hail insurance, fair premiums, apple scions, apple barrels, and grafting wax. These receipts averaged $11.08 per farm in 1924-25, $19.63 in 1925-26, and $7.96 in 1926-27.

TABLE 52

Miscellaneous Returns on Orchards

Item	1924–25	1925–26	1926–27
Hail Insurance	$ 685.00	$1,690.00	$325.00
Fair Premiums	306.00	—	156.00
Apple Scions	—	—	40.00
Apple Barrels	39.00	61.00	34.00
Grafting Wax	—	75.00	185.00
Total	$1,030.00	$1,826.00	$740.00
Average per Farm	$ 11.08	$ 19.63	$ 7.96

Summary of Costs and Returns

The costs and returns of the apple enterprise for each of the three years are summarized in Table 53. The difference between the total costs and credits for appreciation (including value of new plantings), and miscellaneous returns represents the average net cost of producing and marketing apples. The net cost was $1.863 per barrel in 1924-25, $1.930 per barrel in 1925-26, and $2.060 per barrel in 1926-27. The average net cost for the three

year period was $1.952 per barrel. These costs are based on the conditions of disposal of the apple crop. In 1924-25, 83.51 per cent of the apples were sold as marketable fruit including canners; 10.00 per cent as cider apples; .30 per cent was lost by shrinkage; and 6.19 per cent was consumed on the farms. In 1925-26, 75.76 per cent were sold as marketable fruit including canners; 17.05 per cent as cider apples; and 7.19 per cent was consumed on the farms. In 1926-27, 82.92 per cent were sold as marketable fruit including canners; 9.50 per cent as cider apples; shrinkage made up .33 per cent; and 7.25 per cent was consumed on the farms.

TABLE 53

Summary of Costs and Returns in Producing and Marketing Apples

	1924–25			1925–26		
	Total Cost	% of Total	Per Barrel	Total Cost	% of Total	Per Barrel
Costs:						
Human Labor	$24,796.13	34.24	$ .688	$25,000.02	36.68	$ .762
Horse Labor	3,625.08	5.00	.100	2,081.00	3.05	.064
Use of Trucks	1,681.43	2.32	.047	1,449.87	2.13	.044
Use of Tractors	108.80	.15	.003	624.00	.92	.019
Use of Gen. Farm Eqpt.	701.90	.97	.019	437.30	.64	.013
Use of Orchard Eqpt.	1,244.63	1.72	.035	1,675.56	2.46	.051
Use of Buildings	363.56	.50	.010	348.55	.51	.011
Barrels	16,094.00	22.22	.446	14,814.00	21.74	.452
Baskets	342.00	.47	.009	394.00	.58	.012
Spray & Dust Materials	3,470.00	4.79	.096	2,743.00	4.03	.084
Fertilizers & Manure	6,493.71	8.97	.180	6,629.43	9.73	.202
Interest	7,425.00	10.25	.206	7,606.25	11.16	.232
Taxes	2,861.16	3.95	.079	2,972.71	4.36	.091
Apple Trees	776.00	1.07	.022	189.25	.28	.006
Cost of Setting Trees	1,249.84	1.73	.035	304.18	.45	.009
Miscellaneous	1,198.68	1.65	.033	868.92	1.28	.027
Total Costs	$72,431.92	100.00	$2.008	$68,138.04	100.00	$2.079
Returns:						
Apples Sold	$89,286.00	92.16	$2.476	$65,507.00	90.72	$1.998
Home Consumption Salable Fruit	1,773.10	1.83	.049	1,249.50	1.73	.038
Home Consumption Ciders	594.80	.61	.016	574.35	.80	.018
Appreciation	4,200.00	4.34	.116	3,050.00	4.22	.093
Miscellaneous	1,030.00	1.06	.029	1,826.00	2.53	.056
Total Returns	$96,883.90	100.00	$2.686	$72,206.85	100.00	$2.203
Gain			$ .678			$ .124
Net Cost of Producing & Marketing Apples			$1.863			$1.930

Summary of Costs and Returns in Producing and Marketing Apples (concluded)

	1926–27			Three-year Average		
	Total Cost	% of Total	Per Barrel	Total Cost	% of Total	Per Barrel
Costs:						
Human Labor	$18,331.84	34.34	$ .740	$22,709.32	35.09	$ .731
Horse Labor	2,295.27	4.30	.093	2,667.12	4.12	.086
Use of Trucks	1,176.98	2.20	.048	1,436.09	2.22	.046
Use of Tractors	355.20	.67	.014	362.67	.58	.012
Use of Gen. Farm Eqpt.	329.95	.62	.013	489.72	.74	.015
Use of Orchard Eqpt.	1,253.60	2.35	.051	1,391.26	2.18	.046
Use of Buildings	360.86	.68	.015	357.66	.56	.012
Barrels	9,216.00	17.27	.373	13,374.67	20.41	.424
Baskets	321.00	.60	.013	352.33	.55	.011
Spray & Dust Materials	2,984.00	5.59	.121	3,065.67	4.80	.100
Fertilizers & Manure	3,996.32	7.49	.162	5,706.49	8.73	.181
Interest	7,724.40	14.47	.312	7,585.22	11.96	.250
Taxes	3,013.22	5.65	.122	2,949.03	4.65	.097
Apple Trees	423.00	.79	.017	462.75	.71	.015
Cost of Setting Trees	628.72	1.17	.025	725.91	1.12	.023
Miscellaneous	967.26	1.81	.039	1,011.62	1.58	.033
Total Costs	$53,372.62	100.00	$2.158	$64,647.53	100.00	$2.082
Returns:						
Apples Sold	$47,672.00	91.30	$1.927	$67,488.33	91.39	$2.134
Home Consumption: Salable Fruit	1,236.60	2.37	.050	1,419.73	1.98	.046
Home Consumption: Ciders	889.66	1.70	.036	686.27	1.04	.023
Appreciation	1,675.00	3.21	.068	2,975.00	3.92	.092
Miscellaneous	740.00	1.42	.030	1,198.67	1.67	.038
Total Returns	$52,213.26	100.00	$2.111	$73,768.00	100.00	$2.333
Loss			$ .047	Gain		$ .251
Net Cost of Producing & Marketing Apples			$2.060			$1.952

MARKETING OF APPLES

The most important step in the marketing of apples is that of production. Production is used here in the sense of growing the right quantity and quality of apples to supply our own and foreign markets. Quantity production in the United States is mainly beyond the control of an individual grower, but quality production is largely within his power.

The total production of apples on the 93 farms included in this study was equivalent to 36,071 barrels in 1924, 32,770 barrels in 1925, and 24,732 barrels in 1926. The average for the three years shows that 80.63 per cent of the apples were sold as marketable fruit including canners; 12.34 per cent, as cider apples; shrinkage made up .21 per cent; and 6.82 per cent was consumed on the farms. The farm consumption of 6.82 per cent consisted of 2.34 per cent marketable fruit, and 4.48 per cent cider apples.

TABLE 54

Production of Apples by Grade
(All varieties included)

Grades	1924		1925		1926		Three-yr. Av.	
	No. Barrels	% of Total Prod.	No. Barrels	% of Total Prod.	No. Barrels	% of Total Prod.	No. Barrels	% of Total Prod.
Fancy	202	.56	117	.36	198	.80	172	.55
A	3,034	8.41	2,357	7.19	8,096	32.75	4,496	14.41
B	427	1.18	635	1.94	1,674	6.77	912	2.92
Orchard Run	18,752	51.99	15,742	48.03	5,373	21.72	13,289	42.61
Unclassified	5,635	15.62	4,625	14.11	2,011	8.13	4,090	13.11
Canners	2,073	5.75	1,352	4.13	3,153	12.75	2,193	7.03
Ciders	3,607	10.00	5,587	17.05	2,350	9.50	3,848	12.34
Farm Consumption (Salable Fruit	745	2.07	714	2.18	728	2.94	729	2.34
Culls & Ciders	1,487	4.12	1,641	5.01	1,067	4.31	1,398	4.48
Shrinkage	109	.30	—	—	82	.33	64	.21
Total	36,071	100.00	32,770	100.00	24,732	100.00	31,191	100.00

Of the apples sold during the three years, .59 per cent were Fancy[8]; 18.65 per cent A and B; 59.93 per cent Orchard Run and Unclassified; and 20.83 per cent canners and ciders.[9] The

[8]The apple grades for Maine in 1925 and 1926 were as follows:

"Maine Standard Fancy, shall consist of well matured apples of one variety, of normal shape and above the average size and color for the variety, sound and free from worm holes, bruises, scab, or other defect that materially injures the appearance or useful quality of the apple, and shall be properly packed in clean, strong packages.

"Maine Standard A, shall consist of well matured apples of one variety of normal shape and good color for the variety, sound and free from all defects such as worm holes, bruises, scab or other defect that materially injures the appearance or useful quality of the apple, and shall be properly packed in clean, strong packages.

"Maine Standard B, shall consist of well matured apples of one variety, sound, and normal shape, and shall be properly packed in clean, strong packages.

"Maine Orchard Run, shall consist of well matured apples of one variety of the Maine Standard Fancy, Maine Standard A and Maine Standard B grades, and shall be properly packed in clean, strong packages.

"Unclassified. Apples not conforming to the foregoing conditions as to variety, size and other conditions, shall be classed as Unclassified."

Taken from the Statutes of Maine, Chapter 36 R.S., Section 25-34, as amended by Chapter 107, P.L. 1925.

[9]As the Maine Apple Packing Law was revised in 1925, the writer found it advisable to place the 1924 apple crop on a graded basis comparable to the grades of the 1925 Apple Packing Law. This has been done without impairing the results of the study as no radical changes were made in the law.

average production of apples per farm was 387.86 barrels in 1924, 352.37 barrels in 1925, and 265.94 barrels in 1926. This gave an average production of 335.39 barrels per farm for each of the three years. Of this amount, there were, on an average, 1.85 barrels of Fancies; 48.34 barrels of A's; 9.81 barrels of B's; 142.90 barrels of Orchard Run; 43.98 barrels of Unclassified; 23.58 barrels of Canners; 41.38 barrels of cider apples; 22.87 barrels of apples kept for home use; and .68 barrels lost by shrinkage.

TABLE 55

Average Number Barrels of Apples Produced per Farm

Grade	Barrels per Farm			
	1924	1925	1926	Three-yr. Average
Fancy	2.17	1.26	2.13	1.85
A	32.62	25.34	87.07	48.34
B	4.59	6.83	18.00	9.81
Orchard Run	201.65	169.27	57.77	142.90
Unclassified	60.59	49.73	21.62	43.98
Canners	22.29	14.54	33.90	23.58
Ciders	38.78	60.08	25.27	41.38
Farm Consumption: Salable Fruit	8.01	7.68	7.83	7.84
Farm Consumption: Culls & Ciders	15.99	17.64	11.47	15.03
Shrinkage	1.17	—	.88	.68
Total	387.86	352.37	265.94	335.39

Production of the Principal Varieties

The six varieties: Baldwin, Ben Davis, Stark, McIntosh, Northern Spy, and R. I. Greening produced 90.11 per cent of the apple crop in 1924; 90.25 per cent in 1925; and 87.69 per cent in 1926. Of the average production for three years, 54.67 per cent was Baldwin; 12.99 per cent, Ben Davis; 8.53 per cent, Stark; 6.80 per cent, McIntosh; 3.62 per cent, Northern Spy; 2.89 per cent, R. I. Greening; 1.63 per cent, Snow; 1.14 per cent, Gravenstein; and 1.05 per cent, Wealthy. This order of varietal importance can not be expected to continue. Present indications point to a decline in the production of Ben Davis and Baldwin, especially that of the Ben Davis, while a relatively large increase in the production of McIntosh is expected.

TABLE 56

Production of the Leading Varieties of Apples for Each of the Three Years

Variety	1924		1925		1926		Three-yr. Av.	
	Total Prod. (bbls.)	% of Total Prod.	Total Prod. (bbls.)	% of Total Prod.	Total Prod. (bbls.)	% of Total Prod.	Total Prod. (bbls.)	% of Total Prod.
Baldwin	22,542	62.49	15,753	48.08	12,869	52.05	17,055	54.67
Ben Davis	3,254	9.02	6,030	18.40	2,875	11.62	4,053	12.99
Stark	2,640	7.32	2,611	7.97	2,732	11.05	2,661	8.53
McIntosh	1,808	5.01	2,704	8.25	1,855	7.50	2,122	6.80
Northern Spy	1,457	4.04	1,423	4.34	503	2.03	1,128	3.62
R. I. Greening	805	2.23	1,051	3.21	851	3.44	902	2.89
Snow	555	1.54	443	1.35	522	2.11	507	1.63
Gravenstein	439	1.22	312	.95	317	1.28	356	1.14
Wealthy	364	1.01	359	1.10	263	1.06	329	1.05
All Others	2,207	6.12	2,084	6.35	1,945	7.86	2,078	6.68
Total	36,071	100.00	32,770	100.00	24,732	100.00	31,191	100.00

GRADING AND PACKING APPLES

Careful and thorough grading of apples is one of the necessary steps in the marketing of fruit of a high quality. Proper grading is an operation requiring considerable skill and training, gained only through several seasons of experience. Growers would find it to their advantage to assist in the grading of their apples for two reasons: first, to become acquainted with the grades and what apples rightly should be included in each grade; second, to ascertain the causes of culls and cider apples and to use this information to formulate plans for the next year's production program in an attempt to lower the percentage of inferior apples.

Grading and packing operations were generally conducted either in the barn or shed as the weather in the fall makes it necessary to harvest the crop as soon as possible. Growers picked practically all of their apples during the last week of September and the first two weeks of October. The majority of the apples were graded and packed shortly after they were picked. With one exception, grading and packing was performed by hand without the aid of a mechanical grader or sorter.

With each grower responsible for the grading and packing of his apples, there was found considerable variation in the quality of apples within a given grade.

Transportation of Apples

The charges for conveyances used in the hauling of apples from the orchards to the shipping stations and other local points have been given in the cost and return analysis.

Freight rates on apples during the period of the study from local shipping stations to Lewiston and Portland, Maine, and Boston, Massachusetts, are given in Table 57. Some of the larger growers shipped in carload lots, taking advantage of the lower transportation rate per unit. There were, also, several instances during each of the three years where several growers loaded a car together. A carload varied from 150 to 200 barrels, averaging about 180 barrels. The majority of the growers used box cars which were fairly satisfactory during mild weather.

TABLE 57

*Freight Rates (per 100 lbs.) from Local Points to Lewiston and Portland, Maine, and Boston, Mass. During 1924-25-26**

From Local Shipping Points in Oxford County, Maine	To	2nd Class Less carloads Baskets Boxes Crates	3rd Class Less carloads Barrels	5th Class Carload
Buckfield	Lewiston Upper Sta., Me.	$.38½	$.30½	$.16
"	Portland, Me.	.47	.37	.19½
"	Boston, Mass.	.66½	.52½	.27½
East Hebron	Lewiston Upper Sta., Me.	.38	.30	.15½
" "	Portland, Me.	.47	.37	.19½
" "	Boston, Mass.	.66½	.52½	.27½
Norway & So. Paris	Lewiston Upper Sta., Me.	.38	.30	.15½
" " " "	Portland, Me.	.46	.36	.19
" " " "	Boston, Mass.	.64½	.51	.26½

*Courtesy William G. Hunton, Industrial Agent of Maine Central Railroad Company.

The ocean freight rates on apples during the same period from Portland, Maine, to ports of the United Kingdom were as follows: ordinary stowage, $.90 per barrel, and $.30 per box; under refrigeration, $1.40 per barrel, and $.50 per box. Rates for continental ports during this period are given in Table 58.

TABLE 58

*Ocean Freight Rates on Apples from Portland, Maine to Continental Ports**

Effective Date	Antwerp and Rotterdam		Hamburg and Bremen	
	per bbl.	per box	per bbl.	per box
		Ordinary Stowage		
Oct. 3, 1924—Dec. 1, 1926	$1.10	$.37½	$1.20	$.40
Dec. 1, 1926—Sept. 9, 1927	1.25	.42½	1.35	.45
Sept. 9, 1927—----------	1.00	.35	1.10	.40
		Refrigerated		
May 2, 1924—Dec. 1, 1926	1.50	.55	1.55	.60
Dec. 1, 1926—Sept. 9, 1927	1.65	.65	1.75	.70
Sept. 9, 1927—----------	1.50	.55	1.60	.60

*Courtesy of United States Department of Agriculture.

STORAGE OF APPLES

Growers followed the practice of selling most of their apples at harvest time or soon after. Over eighty-seven per cent of the graded apples were sold before December 1 in 1924, 90 per cent in 1925, and 81 per cent in 1926. There was a tendency among growers to sell their better grades of apples earlier in the season than apples graded as Orchard Run and Unclassified. All apples graded as Fancy were sold before December 1 of each year. This emphasizes the fact that consumers have a preference for the better grades of apples even at much higher prices. Prices of apples by grade and variety are shown in Table 62.

There were 3,556 barrels of graded apples sold after November 30 by the growers in 1924-25, 2,308 barrels in 1925-26, and 3,282 barrels in 1926-27. Of these amounts, practically all the apples were stored at least part of the storage period in house cellars. There was an insufficient number of barrels of apples stored of any one variety for a like period of time to give dependable information on shrinkage.[10]

[10]Rates of shrinkage on 21,218 barrels of apples placed in common storage by Maine farmers in October and November, 1924, and taken from storage in December, January, and February were as follows: Baldwins, 9.16 per cent; Ben Davis, 6.29 per cent; Northern Spy, 8.34 per cent; Stark, 9.90 per cent; and R. I. Greening, 15.25 per cent. Seven hundred sixty barrels of high grade Baldwins placed in cold storage in November and taken out in January showed a shrinkage of less than one per cent. (Maine Agr. Exp. Sta. Bul. 339, "An Economic Survey of the Apple Industry in Maine." By Charles H. Merchant, Page 192-3)

TABLE 59

Months Graded Apples Were Sold

Month Sold	1924–25			1925–26			1926–27		
	Barrels Sold	% of Total Sold	Cum. Per-centages	Barrels Sold	% of Total Sold	Cum. Per-centages	Barrels Sold	% of Total Sold	Cum. Per-centages
August	—	—	—	—	—	—	12	.07	.07
September	21	.07	.07	55	.23	.23	1,502	8.66	8.73
October	21,643	77.19	77.26	12,637	53.84	54.07	7,219	41.61	50.34
November	2,822	10.06	87.32	8,475	36.10	90.17	5,337	30.76	81.10
December	316	1.13	88.45	1,404	5.98	96.15	528	3.04	84.14
January	946	3.37	91.82	—	—	—	256	1.47	85.61
February	1,124	4.01	95.83	—	—	—	540	3.11	88.72
March	640	2.28	98.11	—	—	—	321	1.85	90.57
April	—	—	—	—	—	—	—	—	—
May	—	—	—	—	—	—	—	—	—
Thru'out Season	530	1.89	100.00	904	3.85	100.00	1,637	9.43	100.00
Total	28,042	100.00		23,475	100.00		17,352	100.00	

Methods of Selling Apples

Growers sold their apples through seven different marketing channels in 1924-25, six in 1925-26, and eight in 1926-27. The marketing channels used were as follows: to country buyers, export on commission, on commission in domestic markets, to city wholesalers or jobbers, to retailers, direct to consumers, through cooperative organizations, and to peddlers. The above methods of sale do not include the marketing channels through which apple by-products were sold. Canned apples, cider, and vinegar were considered as apple by-products.

Nearly sixty-three per cent of the graded apples were sold to country buyers in 1924-25, 42.90 per cent in 1925-26, and 24.82 per cent in 1926-27. These data show that the country buyers have greatly declined in importance as an outlet for apples. This group of buyers consisted of outside and local purchasers. Several of the local buyers were growers themselves, who represented some eastern wholesale or jobbing concern.

Growers exported 19.86 per cent of their graded apples in 1924-25, 38.58 per cent in 1925-26, and 46.55 per cent in 1926-27. This marketing channel has been gaining in importance during the last three years. Nearly all shipments went to English markets on commission. These markets preferred medium sized apples of good quality. Greater care was required in packing apples for

export shipments than for domestic shipments to avoid slack barrels. Wealthy apples were picked when immature to insure their arrival in good condition.

Sales on commission in domestic markets varied greatly during the three years. In 1924-25, 4.09 per cent of the graded apples were sold through this channel; 10.75 per cent in 1925-26; and only 1.13 per cent in 1926-27. Practically all of the consignment sales were made in markets of the New England States. The rate of the commission charge varied from 5 per cent to nearly 20 per cent of the sale value of the fruit. The commission merchants justified this larger commission charge on the grounds that these apples were not carefully graded and packed.

Sales to wholesalers amounted to 2.14 per cent in 1924-25, and 12.52 per cent in 1926-27. No sales were made to wholesalers in 1925-26. Most of these sales were to markets located in Maine and New Hampshire.

Retailers purchased 2.02 per cent of the graded apples in 1924-25, 3.98 per cent in 1925-26, and 9.10 per cent in 1926-27. Where the grower had established connections with a retailer as several of the larger growers had, this marketing channel was very satisfactory. Only a small percentage of the apples produced in Oxford County can be marketed this way due to the limited capacity of local markets.

Sales made direct to consumers amounted to 3.05 per cent, 3.26 per cent, and 4.08 per cent respectively, of the graded apples sold during the three years. The quantity of apples that may be sold through this method is limited and the expense involved in selling is frequently very high.

Sales made through cooperative organizations amounted to 6.26 per cent of the graded apples in 1924-25, .53 per cent in 1925-26, and 1.73 per cent in 1926-27. The relatively small volume of apples sold through this marketing channel was due in part to the fact that only three of the cooperators in this study were members of cooperative organizations.

Sales to peddlers were unimportant, amounting to only .07 per cent in 1926-27.

In Table 60 is shown the method of sale for winter, fall, and summer varieties. The percentages of the more important varieties sold through various marketing channels are given in Table 61.

TABLE 60

Method of Sale for Winter, Fall, and Summer Varieties

Method of Sale	1924–25				1925–26			
	Percentage of				Percentage of			
	Winter	Fall	Summer	Total	Winter	Fall	Summer	Total
Direct to Consumer	1.84	13.56	100.00	3.05	2.05	10.73	11.11	3.26
To Peddler	—	—	—	—	—	—	—	—
To Retailer	2.17	.55	—	2.02	1.06	22.06	—	3.98
To City Wholesaler	2.01	3.37	—	2.14	—	—	—	—
To Country Buyer	63.97	50.24	—	62.58	46.19	22.59	33.33	42.90
On Commission	3.29	11.54	—	4.09	8.42	24.76	55.56	10.75
Thru Cooperatives	6.36	5.35	—	6.26	.54	.50	—	.53
Export	20.36	15.39	—	19.86	41.74	19.36	—	38.58

Method of Sale	1926–27				Three-year Average			
	Percentage of				Percentage of			
	Winter	Fall	Summer	Total	Winter	Fall	Summer	Total
Direct to Consumer	2.08	17.03	12.00	4.08	1.99	13.77	41.04	3.46
To Peddler	.08	—	—	.07	.03	—	—	.02
To Retailer	6.93	23.27	—	9.10	3.39	15.29	—	5.03
To City Wholesaler	13.48	6.44	—	12.52	5.16	3.27	—	4.89
To Country Buyer	24.51	26.08	88.00	24.82	**44.89**	**32.97**	**40.44**	43.44
On Commission	.81	3.27	—	1.13	4.17	13.19	18.52	5.32
Thru Cooperatives	1.88	.74	—	1.73	2.93	2.20	—	2.84
Export	50.23	23.17	—	46.55	37.44	19.31	—	35.00

TABLE 61

Percentage of Apples Sold Through Various Marketing Channels for Important Varieties

Variety	Method of Sale											
	Direct to Consumer			To Peddler			To Retailer			To City Wholesaler		
	1924-1925	1925-1926	1926-1927	1924-1925	1925-1926	1926-1927	1924-1925	1925-1926	1926-1927	1924-1925	1925-1926	1926-1927
Baldwin	1.18	.52	.33	—	—	—	1.44	1.42	9.69	1.00	—	10.53
Ben Davis	.79	2.79	1.53	—	—	—	11.33	—	—	3.78	—	18.66
Stark	.37	1.09	.59	—	—	—	—	—	.59	.42	—	18.63
McIntosh	20.83	12.72	28.33	—	—	—	.87	28.35	29.71	2.80	—	5.78
Northern Spy	3.87	10.85	4.05	—	—	—	—	1.70	3.54	7.04	—	15.19
R. I. Greening	10.91	1.84	1.50	—	—	—	—	—	16.22	4.55	—	14.55
Snow	1.02	—	4.09	—	—	—	—	12.08	27.50	12.76	—	15.68
Gravenstein	5.21	2.38	1.89	—	—	—	.55	—	5.68	—	—	1.52
Wealthy	11.25	20.70	—	—	—	—	—	—	2.50	—	—	2.00
All Others	9.39	9.08	17.29	—	—	.89	—	5.58	9.17	7.66	—	12.89

Percentage of Apples Sold Through Various Marketing Channels for Important Varieties (concluded)

Variety	Method of Sale											
	To Country Buyer			On Commission			Thru Cooperatives			Exported		
	1924-1925	1925-1926	1926-1927	1924-1925	1925-1926	1926-1927	1924-1925	1925-1926	1926-1927	1924-1925	1925-1926	1926-1927
Baldwin	72.85	59.63	34.50	2.61	8.82	.46	5.65	.74	——	15.27	28.87	44.49
Ben Davis	34.50	22.32	17.27	3.02	3.87	——	1.06	.12	.19	45.52	70.90	62.35
Stark	34.14	18.60	1.47	8.36	11.46	1.23	11.61	.52	3.41	45.10	68.33	74.08
McIntosh	46.79	18.36	30.72	20.03	26.11	4.08	8.68	.13	.75	——	14.33	.63
Northern Spy	69.02	24.04	4.81	6.60	26.81	——	10.83	——	8.86	2.64	36.60	63.55
R. I. Greening	67.99	45.96	12.88	——	1.99	.84	13.82	.71	19.90	2.73	49.50	34.11
Snow	76.01	55.90	33.18	1.28	6.04	——	——	——	——	8.93	25.98	19.55
Gravenstein	89.31	19.05	26.14	2.74	64.29	8.33	2.19	2.38	——	——	11.90	56.44
Wealthy	3.22	4.91	——	——	.70	——	2.57	2.81	3.50	82.96	70.88	92.00
All Others	45.60	61.52	18.63	2.68	6.11	3.95	9.45	.26	3.35	25.22	17.45	33.83

PRICES RECEIVED FOR APPLES

There were wide variations in the prices received for apples by the different growers during each of the three years of the study. The more important factors causing these variations were as follows: variety of apples, grade, kind and quality of pack, time of sale, market sold to, and method of sale.

In Table 62 is shown the three-year average price received per barrel for barreled apples according to grade, for the important varieties. In order to have a sufficient quantity of apples sold within each grade to be representative, it was necessary to include apples sold through all marketing channels throughout the season.

TABLE 62

Three-Year Average Price Received per Barrel for Apples of Important Varieties

Variety	In Barrels					In Bulk	
	Fancy	A	B	Orchard Run	Unclassified	Canners	Ciders
Baldwin	$5.00	$3.10	$2.61	$2.54	$2.10	$1.30	
Ben Davis	——	2.71	2.75	2.20	1.67	1.03	
Stark	——	2.64	2.28	2.32	2.13	1.17	
McIntosh	5.80	4.44	3.90	4.56	4.84	.53	
Northern Spy	——	3.93	3.27	2.81	2.48	1.14	
R. I. Greening	——	2.77	2.22	2.27	2.70	1.11	
Snow	4.33	2.25	——	2.55	2.80	1.00	
Gravenstein	4.00	3.04	2.73	2.75	3.37	——	
Wealthy	——	3.52	2.14	3.67	2.82	.80	
All Others	——	2.22	2.56	2.35	2.68	1.14	
Weighted Average	$5.73	$3.10	$2.64	$2.57	$2.52	$1.24	$ .43

The average price per barrel for the different grades, as shown in Table 62, were as follows: Fancy, $5.73; A, $3.10; B, $2.64; Orchard Run, $2.57; Unclassified, $2.52; Canners, $1.24; and Ciders, $.43. McIntosh showed the highest price received by grade for all graded apples sold. Northern Spy ranked second highest in the price received for A's and B's. Prices received for Baldwins compared very favorably with those received for other varieties.

A comparison of average prices received for barreled apples by growers during each year of the study is shown in Table 63.

TABLE 63

Comparison of Average Prices Received per Barrel for Apples by Grade

Year	in Barrels					in Bulk	
	Fancy	A	B	Orchard Run	Unclassified	Canners	Ciders
1924–25	$4.73	$3.34	$3.20	$3.04	$3.20	$1.41	$ .47
1925–26	7.43	3.08	2.12	2.73	2.03	1.48	.38
1926–27	5.03	2.89	2.59	1.93	2.34	.84	.43

There was an insufficient quantity of apples sold in baskets and boxes to give dependable information on prices by grade and variety. The majority of apples sold in these containers were McIntosh which were sold mainly on local markets.

ORGANIZATION OF APPLE FARMS

The farm business is usually made up of a combination of farm enterprises as no one enterprise furnishes continuous employment for labor, machinery, and capital throughout the day and year. A brief discussion will serve to point out the advantages and disadvantages of the principal combinations of enterprises on apple farms.

Sweet Corn

Sweet corn grown for canning furnishes an important cash crop, and the stover, a valuable feed for cows, especially when put in the silo. A small acreage of this crop fits in well with orcharding. The work of preparing the soil and planting the crop

need not seriously interfere with the spraying or dusting of the apple trees. The cultivation of sweet corn comes at a time when there is little work to be done on the orchard. Where the acreage of sweet corn is large and a large quantity of early apples is produced, there may be a serious conflict of labor for the harvesting of these two crops.

Sweet corn was grown on 47 farms, or 50.54 per cent of the farms in 1924; on 51 farms, or 54.84 per cent in 1925; 46 farms, or 49.46 per cent in 1926. The acreage on these farms was relatively small, averaging 2.4 acres in 1924; 2.0 acres in 1925 and 1926. The average yield per acre was 2,083 pounds, 2,301 pounds, and 2,538 pounds, respectively for the three years. The average price received for sweet corn for canning was 4 cents per pound for each year.

Potatoes

Potatoes compete with sweet corn as a cash crop. Large acreages of potatoes do not fit in well with orcharding. Potatoes and apples compete for labor at harvest time. For this reason, it is seldom advisable to grow a large acreage of potatoes where orcharding is the major enterprise. Potatoes were grown on nearly all the farms during each of the three years. The acreage per farm, for the farmers growing potatoes, was usually very small, averaging only .71 acres in 1924; .67 acres in 1925; and .74 acres in 1926. Only 6 farmers in 1924, 3 in 1925, and 6 in 1926 grew two or more acres of potatoes per farm.

The average yield per acre was 198 bushels in 1924, 174 bushels in 1925, and 224 bushels in 1926. The average price received for potatoes per bushel was $.86, $2.14, and $1.50 respectively for the three years.

Hay Crop

Mixed hay and new seeding hay are grouped together and considered as one crop in this part of the discussion. This crop is very important from the standpoint of furnishing roughage feed for livestock enterprises. Over 96 per cent of the hay produced was fed to livestock. The hay crop fits in well with orcharding as the harvesting of the crop, "haying" does not seriously interfere with the summer spraying or dusting program.

Hay was produced on all farms on a comparatively large acreage. Much of the land area on the farms studied was better

adapted to the production of hay than any other crop. The average acreage of hay per farm was 30.4 acres in 1924, 28.9 acres in 1925, and 30.4 acres in 1926. The average yield per acre was 1.16 tons, 1.12 tons, and 1.10 tons respectively for the three years. Hay sales were relatively unimportant, amounting to 110 tons in 1924, at an average price of $12.40 per ton; 80 tons in 1925, at $12.79 per ton; and 51 tons in 1926, at $10.37 per ton.

Dairy Cows

Dairying was one of the principal farm enterprises on the farms included in this study. Gross receipts from dairy products, excluding the sale of calves, amounted to nearly one-fifth of the total farm receipts. A large portion of the labor on dairy cows, that of milking and caring for the animals, comes in the morning and at night. This work on the dairy reduces the number of hours a day available for working in the orchard. Also the feeding and milking in the morning rather seriously interferes with dusting, as the best results are obtained when dust is applied early in the morning. These disadvantages may be more than offset by the fact that the dairy furnishes considerable work during the winter months when there is little work to be done on the orchard. Dairy cows help to utilize the large amount of hay roughage produced on the farms and the manure furnishes a very valuable by-product for the maintenance of soil fertility.

Dairy cows were kept on 91 farms, or by 98 per cent of the farmers during each of the three years. There was a wide variation in the number of cows kept per farm as shown in Table 64. The average number per farm was 7.3 in 1924-25, 7.0 in 1925-26, and 6.5 in 1926-27. Several farmers with large and well cared for orchards kept a large number of cows per farm. The average gross returns for milk and cream sold per cow was $70.63 in 1924-25, $71.11 in 1925-26, and $72.22 in 1926-27.

Poultry

A large commercial poultry flock is seldom found on an apple farm. Work with poultry very seriously conflicts with orchard operations in the spring and fall. The rearing of chickens comes in April and May when the farmer is busy with spraying and dusting his trees and with grafting work. The placing of the birds in winter quarters comes in October or at the time apple harvest is at its peak. Small flocks of 100 to 300 birds may not seriously

TABLE 64

Average Number of Cows per Farm

Av. No. of cows per farm	1924–25				1925–26				1926–27			
	No. farms	Av. No. per farm	Total	Per cent of Total	No. farms	Av. No. per farm	Total	Per cent of Total	No. farms	Av. No. per farm	Total	Per cent of Total
0 – 2.9	16	1.7	26.5	4.00	16	1.5	24.5	3.87	17	1.4	23.5	3.95
3 – 5.9	23	4.3	98.5	14.88	24	4.4	105.5	16.65	27	4.2	114.5	19.24
6 – 8.9	24	7.1	171.0	25.83	27	7.2	194.5	30.71	24	6.9	165.0	27.73
9 – 11.9	11	9.0	109.0	16.46	10	9.6	95.5	15.07	11	10.0	110.5	18.57
12 – 14.9	9	12.7	114.5	17.30	8	12.9	103.5	16.34	7	13.6	95.0	15.97
15 – 17.9	6	16.2	97.5	14.73	3	15.5	46.5	7.34	4	15.4	61.5	10.34
18 – 20.9	1	20.0	20.0	3.02	2	18.0	36.0	5.68	—	—	—	—
21 & over	1	25.0	25.0	3.78	1	27.5	27.5	4.34	1	25.0	25.0	4.20
Total	91	7.3	662.0	100.0	91	7.0	633.5	100.00	91	6.5	595.0	100.00

interfere with orchard operations if the work on the farm is carefully organized.

Poultry was kept on 84 farms, or by 90.32 per cent of the farmers in 1924-25; and on 83 farms, or by 89.25 per cent of the farmers in 1925-26 and 1926-27. Only three farmers in 1924-25, and two in 1925-26 and 1926-27 had flocks of 200 birds and over. The average number of birds per farm where poultry was kept was 52 in 1924-25, 55 in 1925-26, and 49 in 1926-27.

Size of the Farm Business

Due to misleading facts, there has resulted much misunderstanding as to the relation of the size of the farm business and the returns from farming. Too often comparisons have been made between different types of farming on the basis of the size of the farm rather than on the basis of the size of the farm business.

There are several methods of measuring the size of the farm business. The more important of these are: acres of land, acres of crops, number of bearing apple trees, number of cows, number of hens, number of other important productive livestock, number of men, amount of productive work done, and amount of capital invested. The two last named measures represent methods of combining the other measures of size into convenient indexes. They are more reliable in comparing farm businesses having different types of farming, while the other measures of size are more useful where the farms are of the same type.

Although all the farms included in this study had bearing orchards of commercial importance several types of farming were found. The more important types were: orcharding; dairying and orcharding, with and without sweet corn; growing potatoes and orcharding; truck growing and orcharding; and general farming with orcharding as an important enterprise. The indexes of size of farm business most useful for comparing these farms are the amount of productive work done and the amount of capital invested.

In Table 65 is shown the relation of the size of farm business to labor income as measured by total productive man labor. A small business has relatively little opportunity for a large return and also little chance for a large loss. Large businesses have a greater opportunity for a larger gain as well as a larger loss. There

were on an average for the three years, 36.3 farmers having a farm business of less than 300 productive man work units[11] per farm. Twenty-two of these farmers received labor incomes under $200 and the average of these was minus $313; while 14.3 farmers received labor incomes over $200 and these averaged plus $528 per farm. Farm businesses with over 600 productive man work units per farm showed the largest returns and also the largest losses. The three-year average showed that 4.7 farmers received an average labor income of minus $808; while 5.7 farmers received an average labor income of plus $1,549.

TABLE 65

Total Productive Man Work Units and Labor Income
Average of 93 Farms for 3 Years

Total Productive Man Work Units	Average No. Farms	Labor Income
Less than 300 P. M. W. Units		
Labor Income Under $200	22.0	$— 313.47
Labor Income Over $200	14.3	+ 527.88
300 — 599 P. M. W. Units		
Labor Income Under $200	20.7	— 453.76
Labor Income Over $200	25.6	+ 778.17
600 & Over P. M. W. Units		
Labor Income Under $200	4.7	— 807.57
Labor Income Over $200	5.7	+1,549.24

When the amount of capital invested is used as an index of the size of the farm business it shows the same relation of size of farm business to success as was shown when productive man work units were used. These data are given in Table 66.

There are several reasons why large businesses usually pay better than smaller ones.

1. Greater efficiency of human labor.
2. Greater efficiency of horse labor.
3. Greater efficiency of machinery and equipment.
4. Smaller percentage of the capital in buildings and unproductive parts of the farm business.

[11]A productive man work unit is equivalent to approximately ten hours of productive work.

5. Advantages coherent with large volume of business both in buying and selling.
6. Better farm balance or better combination of farm enterprises.

TABLE 66

Total Capital Invested and Labor Income
Average of 93 Farms for 3 Years

Capital	Average No. Farms	Labor Income
Less than $4000		
Labor Income Under $200	7.7	$— 183
Labor Income Over $200	5.6	+ 546
$4000 — $7,999		
Labor Income Under $200	16.7	— 286
Labor Income Over $200	24.0	+ 718
$8000 — $11,999		
Labor Income Under $200	16.7	— 490
Labor Income Over $200	13.7	+ 877
$12,000 & Over		
Labor Income Under $200	6.3	— 902
Labor Income Over $200	2.3	+1,712

It is shown in Table 67 that the large size farm businesses use labor, machinery and capital more efficiently than small size businesses. On farms of small size, those having less than 300 productive man work units per farm, human labor was engaged at productive work 173 ten-hour days during the year, horse labor at the rate of 48 ten-hour days per work animal, the average value of machinery per crop acre was $24.09, and 28.71 per cent of the capital invested was in buildings. On medium size businesses, farms having 300 to 599 productive man work units per farm, human labor was employed at productive work 271 ten-hour days, horse labor 70 ten-hour days, the average value of machinery per crop acre was $21.92, and 27.30 per cent of the capital invested was in buildings. On large size businesses, those having 600 or more productive man work units per farm, human labor worked at productive work 326 ten-hour days, horse labor 102 ten-hour days, the average value of machinery per crop acre was $20.45, and 25.85 per cent of the invested capital was in buildings.

TABLE 67

Size of Farm Business and the Efficiency of Labor, Machinery, and Capital, Average of 93 Farms for 3 Years

Productive Man Work Units	Average Number Farms	Productive Man Work Units Per Man	Productive Horse Work Units Per Horse	Value Machinery Per Crop Acre	Per cent of Capital in Buildings
Less 300	36.3	173	48	$24.09	28.71
300 – 599	46.4	271	70	21.92	27.30
600 & Over	10.3	326	102	20.45	25.85
Average		239	65	22.61	27.69

There are many ways of increasing the size of the farm business. They may for convenience be classified as (1) intensifying the farm business on the present land area, (2) extending the area of the farm to enable the growing of a larger acreage of crops or the keeping of more livestock or both. Of the 93 farms included in this study, there were several who could advantageously increase the size of their business by increasing their crop yields and returns per productive animal on their present land area. While other farmers could best increase the size of their business by extending the area of the farm—to enable the growing of a larger acreage of crops and the keeping of more livestock. If a farmer finds that his production rates are considerably below the average for his community, he can profitably consider increasing the size of his business by intensifying rather than extending the area.

Size of the farm business alone does not indicate success or failure in farming. Other factors such as production rates and balance must be considered.

PRODUCTION RATES

The advantage of large size businesses may be sacrificed by low rates of production. As a foundation for good rates of production, farmers should have good land and good animals. These factors, combined with good size of farm businesses, good farm balances, good markets, and good farmers, represent a combination for successful farming which is difficult to excel.

On crop farms, the production rates for crops (crop indexes[12])

[12]Crop index expresses in percentage the yield of crops on an individual farm in comparison with average yields for Maine.

are more important than production rates for livestock. The opposite is true for livestock farms. Since the livestock enterprises on the farms included in this study were as important as the crops grown, the rates of production for both must be considered. Farmers having crop indexes of less than 90 and gross returns from livestock of less than $75 per productive animal unit, received on an average, the lowest labor income, that of minus $225. Those having crop indexes of 111 and over, and gross returns of $126 and over per productive animal unit, received on an average, the highest labor income, that of plus $753. This is a difference of $978 in labor income in favor of the farms having the highest rates of production for both crops and livestock enterprises. These data are given in Table 68 and show conclusively the importance of good crop yields and good rates of production for animals.

TABLE 68

Rates of Production and Labor Income
Average of 93 Farms for 3 Years

Crop Index	Gross Returns per Productive Animal Unit							
	Less than $75		$75 — $125		$126 & over		Average	
	No. of Farms	Labor Income	No. of Farms	Labor Income	No. of Farms	Labor Income	No. of Farms	Labor Income
Less than 90	11.3	—$225	12.3	—$ 76	4.7	+$532	28.3	—$ 35
90 — 110	8.7	— 206	14.3	+ 142	8.0	+ 656	31.0	+ 177
111 & over	7.7	— 148	19.3	+ 408	6.7	+ 753	33.7	+ 350
Average	27.7	— 198	45.9	+ 195	19.4	+ 660	93.0	+ 174

FARM BALANCE

Farm balance—the adjustment of farm enterprises—is another very important factor in the success of farming. An ideal farm balance is one that meets the following requirements: provides for the most efficient use of labor and machinery for the region and under the prevailing conditions; provides for the most effective use of the land area; provides for the keeping of sufficient livestock to most efficiently utilize the by-product feedstuffs produced on the farm; furnishes the most profitable use of farm manure and purchased fertilizers in the maintenance of soil fertility; provides for the most efficient use of farm buildings and

equipment; furnishes an income fairly well distributed throughout the year; provides for a farm business in which the risks are reduced to a minimum.

On the farms studied many variations were found in the factors that make up a good farm balance. These variations were due largely to several different types of farming and to the degree of efficiency on the individual farms.

The farm business consists of a combination of enterprises, none of which furnishes continuous employment throughout the day and year. One should select those enterprises which provide for the most efficient employment of himself and his help each working day of the year at productive work with the necessary maintenance work. Work animals must be employed at productive work throughout the year for the maximum efficiency.

Some specialized apple farms had a very poor distribution of labor as compared with farms where orcharding was combined with other farm enterprises. This situation could be corrected partly if profitable employment could be secured during the winter months such as working in the woods, hauling and trucking, and miscellaneous winter jobs, or increasing the livestock enterprises. It would probably pay some farmers to increase their livestock enterprises either in size or in better animals or both.

The maintenance of good soil fertility is essential to good crop yields. In the region studied crop yields were closely related to the amounts of manure and commercial fertilizers applied per crop acre. An average (for the three years) crop index of 63 was obtained by farmers who had more than eight acres of crops per animal unit and applied less than $1.00 of commercial fertilizer per acre. Farmers with less than 4 acres of crops per animal unit and who applied $3.00 or more of commercial fertilizer per crop acre had an average crop index of 129. The latter group of farmers secured an average production rate of approximately twice that of the first group. In Table 69 is shown the relationship of fertilization to crop yields expressed in terms of crop indexes.

A summary of the use of fertilizers and lime for each of the three years is given in Table 70. Of the fertilizers used on the farms in 1924, 32.89 per cent was nitrate of soda; 16.40 per cent, 4-8-4; 12.34 per cent, 5-8-7; 10.63 per cent, acid phosphate; and the remaining 27.74 per cent was made up of fertilizers of other

TABLE 69

Fertilization and Crop Yield
Average of 93 Farms for 3 Years

Purchased Fertilizer Per Crop Acre	Acres of Crops per Animal Unit		
	8 & Over	4 — 7.9	Less than 4
Less than $1.00			
No. of Farms	3.0	12.7	28.3
Crop Index	63	81	106
$1.00 — $1.99			
No. of Farms	—	4.3	16.4
Crop Index	—	99	106
$2.00 — $2.99			
No. of Farms	1.3	2.3	10.7
Crop Index	93	94	117
$3.00 & Over			
No. of Farms	1.3	2.4	10.3
Crop Index	98	96	129

analyses. In 1925, 44.17 per cent of the fertilizers used was nitrate of soda; 21.86 per cent, 4-8-4; 9.46 per cent, 4-6-10; 8.97 per cent, 5-8-7; and the remaining 15.54 per cent was composed of fertilizers of various other formulae. In 1926, 32.94 per cent of the fertilizers used was nitrate of soda; 19.10 per cent, 5-8-7; 17.18 per cent,

TABLE 70

Summary of Fertilizer and Lime Used on 93 Farms

Forms of Fertilizer and Lime	1924		1925		1926	
	Pounds Used	% of Total	Pounds Used	% of Total	Pounds Used	% of Total
Nitrate of soda	72,135	32.89	76,100	44.17	61,104	32.94
4 — 8 — 4	35,980	16.40	37,675	21.86	31,875	17.18
5 — 8 — 7	27,076	12.34	15,450	8.97	35,425	19.10
4 — 6 — 10	18,404	8.39	16,300	9.46	10,700	5.77
Acid Phosphate	23,325	10.63	8,900	5.16	12,695	6.84
6 — 8 — 10	20,738	9.45	8,100	4.70	200	.11
3 — 8 — 4	2,925	1.33	—	—	5,250	2.83
4 — 8 — 10	200	.09	400	.23	4,700	2.53
2 — 8 — 2	1,800	.82	2,300	1.33	1,200	.65
5 — 8 — 10	—	—	—	—	3,300	1.78
3 — 8 — 3	4,908	2.24	—	—	—	—
4 — 10 — 4	4,000	1.82	—	—	—	—
6 — 4 — 10	—	—	2,500	1.45	—	—
4 — 8 — 6	1,575	.72	—	—	1,800	.97
Sulphate of Ammonia	—	—	—	—	2,600	1.40
2 — 8 — 5	—	—	—	—	1,900	1.02
Other Known Analyses	6,320	2.88	4,600	2.67	5,650	3.05
Unknown	—	—	—	—	7,100	3.83
Total	219,386	100.00	172,325	100.00	185,499	100.00
Ground Limestone	63,098	100.00	—	—	12,000	100.00

4-8-4; and the remaining 30.78 per cent was made up of various other fertilizers. A total of 31.5 tons of ground limestone was applied in 1924, and 6 tons in 1926.

The fertilizer most commonly used on potatoes for each of the three years was 5-8-7. The average rate of application was 963 lbs. per acre. The other important fertilizers used on the potato crop were: 4-6-10, 4-8-4, and 6-8-10.

The fertilizer most commonly used on sweet corn was 4-8-4. The average rate of application was 385 lbs. per acre. Other fertilizers used on sweet corn were relatively unimportant.

The use of fertilizer on the orchards is given on pages 102-103.

In 1924-25, 38.34 per cent of the manure spread was on the sweet corn; 20.70 per cent on the orchard; 14.51 per cent on potatoes; 8.18 per cent on silage corn; 7.59 per cent on the hay crop; and the remaining 10.68 per cent on other crops. During 1925-26, 28.23 per cent of the manure was applied to sweet corn; 23.38 per cent to the orchard; 15.87 per cent to the hay crop; 14.60 per cent to potatoes; 8.42 per cent to silage corn; and the remaining 9.50 per cent to other crops. In 1926-27, 33.58 per cent of the manure spread was on the sweet corn; 19.57 per cent on potatoes; 14.05 per cent on silage corn; 12.45 per cent on the orchard;

TABLE 71

*Summary of Manure Applied**

Crop Applied to	1924–25			1925–26			1926–27		
	Tons Applied	Tons Used per A.	% of Total Tons	Tons Applied	Tons Used per A.	% of Total Tons	Tons Applied	Tons Used per A.	% of Total Tons
Corn for Grain	98	33	1.46	125	36	1.98	121	40	2.42
Fodder Corn	80	23	1.19	198	24	3.13	201	18	4.02
Silage Corn	550	21	8.18	532	21	8.42	703	20	14.05
Sweet Corn	2,578	24	38.34	1,782	20	28.23	1,680	19	33.58
Potatoes	976	22	14.51	922	24	14.60	979	21	19.57
Orchard†	1,392	8	20.70	1,477	6	23.38	623	5	12.45
New Seeding Hay	14	7	.21	143	14	2.26	—	—	—
Mixed Hay	496	12	7.38	860	6	13.61	423	8	8.45
Oats	19	19	.28	100	17	1.58	—	—	—
Oat Hay	214	21	3.18	120	15	1.90	99	13	1.98
Millet	146	22	2.17	42	19	.66	100	27	2.00
Beans	124	20	1.84	16	19	.25	74	19	1.48
Barley	38	38	.56	—	—	—	—	—	—
Total	6,725	Av. 16	100.00	6,317	Av. 11	100.00	5,003	Av. 13	100.00

*No account was taken of the manure not spread.
†Applications in orchards were mainly around the trees.

8.45 per cent on the hay crop; and the remaining 11.90 per cent on other crops.

The (weighted) average rate of application per acre to the sweet corn crop (for the three years) was 20.9 tons; to potatoes, 22.4 tons; to silage corn, 20.6 tons; to the hay crop, 7.8 tons; and to the orchard 6.6 tons.

Manure is a valuable by-product of livestock enterprises and should be handled in the most effective way. Manure which is stored for a considerable length of time unprotected from the elements of the weather, loses much of its fertilizing properties. From experiments which have been made, it may be assumed that the average farm manure loses approximately 45 per cent organic matter; 50 per cent nitrogen; 30 per cent phosphoric acid; 50 per cent potash; and 50 per cent lime, when stored unprotected for six to nine months. Experiments have also shown that frequent light applications are more economical than infrequent heavy applications.

Successful Farms

The degree of success attained in farming is closely related to the relative efficiency of all the factors of the farm business. The main weaknesses should be given the first and most careful consideration, and an attempt made to gradually correct these conditions. In Table 72 are shown the averages of the principal factors of the farm business for three years of (1) all farms, (2) the ten most successful ones. Farmers operating the most successful farms had relatively large size businesses, good farm balances, high production rates for crops and livestock, good efficiency in labor and capital, and all the advantages of large and efficient farm businesses.

TABLE 72

Three Year Averages of the Principal Factors of the Farm Business for All Farms and for the Most Successful Ones

Factors	Average of All Farms	Average of 10 Most Successful Farms
Number of Farms	93	10
Labor Income	+$ 174	+$1,402
Size of Business		
Productive Man Work Units	384	529
Productive Horse Work Units	157	245
Acres of Crops	39.02	41.03
Acres of Pasture	36.28	47.43
No. of Apple Trees:		
Bearing	520	790
Non-bearing	88	206
Number of Animal Units	13.00	12.62
Average No. of Cows	6.77	5.95
Average No. of Hens	46.22	71.17
Average No. of Sheep	.21	2.35
Man Equivalent	1.62	1.62
Capital	$7,591	$8,050
Balance		
Acres of Crops per Animal Unit	3.00	3.25
Value Purchased Fertilizer per Acre	1.56	2.33
Total Receipts from:		
Crops	$ 990	$1,674
Livestock	1,047	1,331
Miscellaneous	486	896
Production		
Crop Index	104	111
Returns per Productive Animal Unit	$ 100	$ 129
Labor Efficiency		
Productive Man Work Units per Man	237	326
Acres of Crops per Man	24.09	25.33
Animal Units (except work animals) per man	6.5	6.0
Prod. Horse Work Units per Work Animal	65	73
Acres of Crops per Work Animal	17.44	12.48
Capital Efficiency		
Per cent of Capital in Buildings	27.69	24.75
Value of Machinery per Crop Acre	$ 22.60	$ 23.56